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Development of a strategic and tactical game plan for junior mining companies

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CHAPTER 1. INTRODUCTION

1.1 Background to Research - The Game Approach

The Oxford English Online Dictionary[(1)] defines the word game as follows: "A diversion of the nature of a contest, played according to rules, and displaying in the result the superiority either in skill, strength, or good fortune of the winner or winners".

A game has certain rules, which the players are confined to, but within these rules there is a high degree of variability and players use different strategies in order to succeed. Each game has either an offensive or defensive approach to it, which can, respectively, lead to success or failure. Humanity enjoys games, where there is ultimately a winner and a loser.

Each game has two or more players or teams competing against one another. The players need to devise their strategy and ultimately execute the strategy successfully in order to win the game. Failure will require the participants to re-evaluate their strategy, change it and execute it in a different manner in order to achieve success.

Each game has a goal. In soccer it is to score more goals than the opposite team; in business it is to be smarter than the competitor, grow market share and ultimately make a profit for shareholders, in a manner that takes into account the needs and wants of society in general.

Robert Kiyosaki [(2)], author of the successful book *Rich Dad - Poor Dad* has developed a game, called Cash Flow 101. The educational game is aimed at people who want to improve their financial intelligence, and the motto is: "*The more you play this game, the richer you become*". Players have to take on the role of an individual in a financial rat race. The purpose of the game is for participants to set a dream financial goal, and play the game in such a manner that they arrive at this goal first. In order to achieve the goal players must shrewdly accept or reject opportunities that are presented to them in order to

reach financial independence. Each player needs a strategic plan, and there is the risk that he or she can lose everything. The rules are clear: once your passive income equals expenses, you are financially independent and you may enter the big league. If you have a negative cash flow, you have lost. The game is highly educational and simulates real life challenges. By the time it is complete, participants have significantly improved their financial literacy.

The ultimate strategic game is chess. Ilbury and Sunter[3], in "*Games that Foxes play*", refer to the significance of chess as a strategic game. The game is a royal and ancient strategic game that demands of the player an all-encompassing passion and precision of movement. The historic conqueror and French ruler Napoleon, who restored order after the French revolution and attempted to change the whole of Europe, is referred to as being a strong chess player. A Russian military leader keen to expand the borders of the Russian empire in the eighteenth century commanded junior officers to play chess in front of him so he could study the strategies that unfolded.

1.2 The Need for a Game Plan in the Dynamic Mining Industry

The mining industry is focussed on the economic exploitation of minerals. Mining companies engage in a host of different activities in order to satisfy shareholders' interests: these are the development of new mining ventures; engaging in partnerships with other mining companies; brownfields expansions; optimising existing mining operations; and pursuing value-added opportunities in beneficiation. A host of key success factors contribute to global competitiveness of a mining company. These are the orebody, the commodity market, access to finance, operations technology, production management, capital and operating costs, the host country of the mining venture, the team managing the company, executing the project and operating the venture. Mining financiers in London even narrow it down to three criteria: people, projects and places.

In comparison to other industries, new mining projects have a long lead-time. A mining project undergoes a host of project stages prior to commencement of production. These stages of exploration, feasibility studies, raising of finance, satisfying community needs, design, construction and commissioning often take years to complete. During the course of implementing projects, global scenarios and pressures frequently change. Only the most robust of projects will proceed to a stage of final implementation, with many projects remaining at a feasibility stage.

The effects of globalisation, in particular the awakening of China and India, are affecting mining businesses worldwide. Throughout the period of this research (2000 – 2006), commodity prices have both decreased as well as increased massively. Fluctuating commodity prices are forcing mining companies continuously to re-strategize. While globalisation brings many opportunities, such as increasing market access and opportunities for export, it also brings many challenges, such as increased and fierce competition for global resources, investment, skills, environmental pressure groups and the need to conform to international corporate governance standards.

In the global mining industry there has been an extensive change of ownership as a result of a period of mergers and acquisitions. Canadian-, Australian- and UK-based major and junior miners are honing in on exploration and mining opportunities in Africa. In South Africa, the mining industry, with a host of ageing mines, is subject to extensive government pressure to change its shareholding structure, presenting concerns to existing shareholders and opportunities for new players. The market has become increasingly competitive, with mining companies having to compete in a global marketplace for finance, resources, skills and markets.

Many mineral-rich countries in Africa, in need of foreign investment, have changed to more favourable mining investment policies. International and South African mining companies, lured by huge mining potential, investment-friendly conditions and the promise of large profits, have poured millions of dollars into Sub-Saharan countries to

commence exploration projects, revitalize old mines or initiate greenfields mining projects.

Mining can be seen as a game played by major corporates, such as BHP Billiton, RTZ or Anglo American, as well as a host of junior mining companies, who provide a feedstock of projects to the majors. Junior miners are on the forefront of establishing new mining ventures, focussing primarily on exploration and feasibilities, but also taking projects to a production stage.

In this ever-changing, complex and dynamic environment, mining companies, and in particular junior mining companies, need a game plan which they can apply in order to enhance their success rate in this environment. The companies need to develop strategies that position their mining assets favourably as compared to their competitors; they need to conclude attractive deals which will grow the mining asset base and enable financing; and they need to ensure that the asset is optimally managed. In addition, as the economies of the world become more interdependent, the concept of business risk identification and management becomes vital**.**

Most Canadian and Australian junior mining companies have perfected this game, whereas many South African miners, coming from a "big mine mindset" are lagging behind in junior mining. The ideal distribution of mining operations (Figure 1.1) is represented by a triangle, with artisanal and small scale operations as a foundation, followed by small scale and junior operations, mid-tier operations and major mines at the peak of the triangle. In Canada and Australia strong junior mining companies have played a significant role in strengthening of mineral economies.

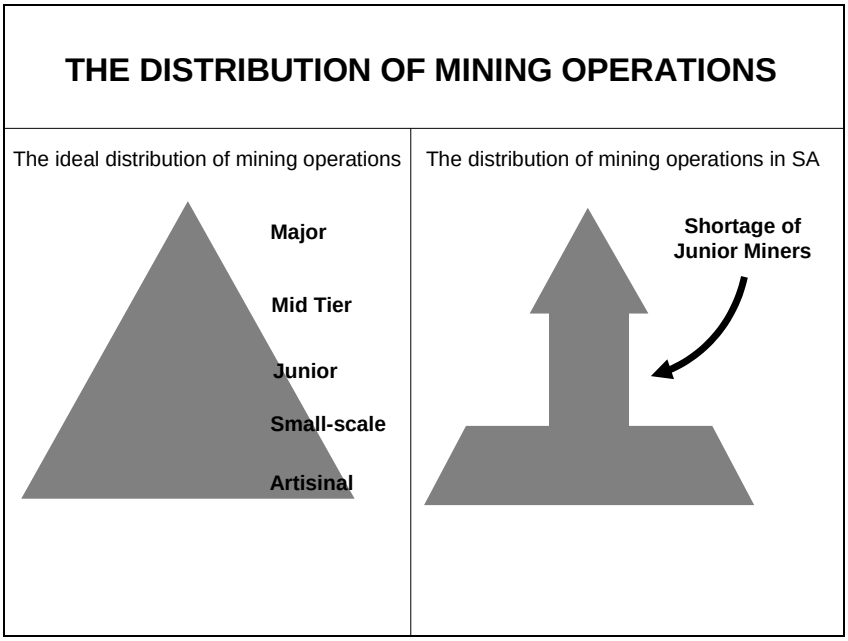


Figure 1.1 Distribution of mining operations – ideal vs. South African

In South Africa, the mining industry has for a very long time been characterised by large-scale mining operations owned by major mining companies, as well as an artisanal sector. There has been a poor representation of junior mining companies. There is a need to normalise the distribution of mining operations by establishing a strong junior mining sector [(113)]. In order to achieve this, a game plan needs to be developed to establish competitive South African junior mining companies that can compete globally against well-established Canadian and Australian junior mining companies**.**

1.3 Aims and Objectives of the Thesis

The aim and objective of this thesis is to develop a game plan for junior mining companies. It is aimed at junior mining company executives, mining entrepreneurs and mining investors whose aim it is to establish and grow a true market winning junior mining company that is globally competitive.

The game plan is defined by the foundation and set of rules, the players, the activities and steps of playing the game, and the goal and definition of winning. It needs to be holistic

as well as detailed, and focus on strategic, financial and legal, operational and risk aspects of the mining venture. The game plan should be universal enough to cater for junior mining companies in diverse commodities. It should be comprehensive and user-friendly and should be able to be presented in a graphic form for use at brainstorming sessions by the team. The game plan should incorporate the practical realities of starting, growing and managing a junior mining company.

Junior mining company executives need to play it prior to the actual investment, similar to chess or Robert Kiyosaki's cash flow game, the motto being: *"The more we play it, the greater our chances of success!* [(2)]*"*. Playing the game must contribute to the junior mining company becoming a winner in the resources market.

The ultimate aim of the thesis is a defined game plan, which can be used by mining entrepreneurs and investors of junior mining companies who are pursuing mining ventures in Africa. The game plan should facilitate thought processes and actions by decision makers that will ultimately lead to more successful mining ventures, in particular those pursued by South African junior miners, who are lagging behind their international peers.

1.4 Strategic versus Tactical Elements in the Game Plan for Junior Mining Companies

A game plan that delivers winning results needs to have a balance between strategic elements and tactical elements. The Oxford Advanced Dictionary [(4)] defines these two elements as follows:
Strategy: The art of planning operations in war; and *tactic: the means of achieving an object, art of placing moving forces for or during battle*.

Applying these definitions to a game plan for junior mining, the following comparison may be applied: Both strategy and tactics need to be taken into account when developing

a junior mining venture. The strategic elements of a game plan entail the strategic thought processes that lead up to the selection of a strategy, ready for implementation. The tactical elements in junior mining are defined as those elements that centre around the execution of the strategy, that is, aspects pertaining to structuring deals, financing of exploration, feasibility and mining ventures, operations management and risk management.

Neither element is sufficient on its own. A game plan that focuses purely on strategy will lack the element of execution, leading to the common proverb amongst entrepreneurs “all talk, no action”. Strategic plans remain useless unless executed. On the other hand, purely focusing on execution, without a strategic plan, will undoubtedly lead the junior miner astray in the maze of the resources sector and undoubtedly lead to significant financial losses.

Hence, the thesis will provide an approach that integrates these concepts and presents a game plan with both strategic and tactical elements for junior miners.

1.5 Research Strategy

To begin with, the author studied the junior mining market. To this extent, a detailed analysis of twenty junior mining companies was undertaken, five each from the global mining centres: Australia, Canada, the UK and South Africa. From this, a clear understanding evolved of the mine development process, a review of the players in the game, a detailed analysis of exploration and mine development projects in Africa and a review of commodity markets.

The actual game is an integrative, iterative play of strategy, financial and legal, operations and risk management processes. The author has undertaken research into existing management theories and applied it to mining companies. The author has undertaken turnaround projects of mining companies across the globe and the experience

gained and the practical challenges of achieving global competitiveness will form the basis of the development of a game plan. The author has also developed a course called, "Strategy and Business Management for Mining Companies", which was held as a postgraduate course at the Department of Mining Engineering at the University of the Witwatersrand in 2002 and 2003. The thesis draws extensively from the course material developed. The author has also undertaken mining financing campaigns for a junior mining company in Johannesburg and London, and the information obtained, as well as practical experiences gained, have been integrated into the research.

For the purposes of scoring the game, a mining venture score matrix has been developed, using Excel as a foundation. This is the scoring and assessment tool for mining entrepreneurs and investors pursuing junior mining ventures.

To test the effectiveness of the thesis and further refine it, the game plan is applied to a hypothetical junior coal mining company in South Africa. The game plan will have served its purpose, so that after playing it, the junior mining company would have been positioned for global competitiveness. Here the author has drawn extensively on his practical experiences gained from founding, managing and growing a coal junior mining company in South Africa.

1.6 Outline of the Thesis

Chapter 1 provides an overview of the thesis and objectives, the methodology adopted, and the subjects of research forming the basis of the thesis**.**

Chapter 2 explores the dynamics in the global, African and South African resources sector and highlights the need for a game plan for junior miners to succeed in this currently buoyant, but continuously changing environment.

Chapter 3 presents the development of the game plan for junior miners. The task is to lay out a game plan in a linear fashion. In a logical sequence, the various elements are developed and fitted together to lead ultimately to a game plan, ready for use. The elements entail the game foundation, the player, the company's mining assets, the business pillars of strategy development, deal structuring and financing, operations management and risk management, the element of scoring the game and the definition of winning.

In Chapter 4 the supporting databases for the game plan are developed which serve as a reference and benchmark for the game plan. Twenty listed junior mining companies, from the Toronto, Australian, London and Johannesburg stock exchanges were analysed and were classified into top, medium and poor performers. The companies were analyzed in terms of corporate structures, strategy, operations, teams and financial performance. The analysis provides an insight into the game plans of the top performing junior mining companies and serves as a benchmark for the game plan.
Further databases have been based on practical experiences gained in mine optimisation projects and research into risk management for mining.

Chapter 5 focuses on playing the game, with a view to creating a realistic case study for reference purposes. A hypothetical coal junior mining company is presented with medium-sized assets in South Africa and Mozambique The intention of this company is to be listed on a mining venture stock exchange. The game plan is played step by step, and further refined using the concepts defined and developed in Chapter 4. The chapter concludes with an overall company score.

Chapter 6 concludes the thesis by presenting the generic game plan model which can be applied to any junior mining company in any commodity. The game plan elements are laid out in a logical fashion, with the foundational elements, game plan pillars and supporting databases and models. In this generic format, the game plan can be applied to any junior mining venture in any commodity.

1.7 Limitations to the Research

The author realizes that the topics of game planning, strategy, financial and legal, operations and risk management are vast. Only management theories applicable to mining companies have been used to create a game plan.

For the purpose of data analysis, 20 listed mid-tier and junior mining companies have been analyzed. It is assumed that by analyzing five junior mining companies from each global mining centre, a representative picture has been provided and sufficient data collected for the game plan design. No major mining companies have been analyzed, as the focus is on entrepreneurial junior mining companies, rather than well-established, billion-dollar mining businesses that have been operational for many decades. Nevertheless, the game plan can be successfully applied to major mining companies.

The author also realizes that each mining venture is unique and it is beyond the scope of this research thesis to apply the game plan to each type of mining investment. Instead, the author has created a generalized game plan, central to mining investments in Africa, but which may also be applicable to mining ventures globally.

The author has over the period of research compiled an extensive data base from annual financial reports, the World Wide Web, management theories, course work material, capital-raising initiatives and mine turnaround projects. Hence, no questionnaire was required.

1.8 Definitions

Throughout the thesis several mining and investment terms are used frequently. It is assumed that the reader has a basic understanding of mining and mineral economics. Below, definitions of terms are provided.

Game	An activity involving one or more players, defined by a goal and a set of rules that determines what the players can or can not do.
Game plan	A blueprint for the players of the game that defines the elements of the game and the moves and processes of winning.
Player	The junior mining company playing the game of developing mining assets, raising finance, concluding deals with the intent of increasing shareholder value. It is represented by the founding team of entrepreneurs and the investors in the company.
Goal	The goal of junior mining is to create an attractive investment, growing the junior mining company to a mid tier company or a buyout of the company by a major mining company.
Junior mining company	A small, entrepreneurial mining company that is focused on the identification of exploration targets, undertakes exploration, develops feasibility studies and in some cases develops mines in-house.
JMC	Abbreviation for junior mining company
Junior mining venture	A junior mining venture is a business concept that is being developed and executed in the junior mining sector. Ingredients for a successful venture are a prospective mining asset, a well structured company with a business plan, an experienced team, sound strategic and tactical plans, finance, an attractive commodity market and supportive mineral legislation.
Major mining company	A well established mining company with a host of medium to large scale mining operations.
Mid tier mining company	A junior mining company that is in the process of evolving into a major mining company, with multiple mining operations and mining projects.

Mining asset	Any asset on the value chain of mining. This can include an exploration project, a mining feasibility study, a mine development project or an operational mine.
EXR	The hypothetical coal junior mining company Energy –X Resources
Resource	Any orebody starts at a level of mineral resources [33], which is defined as a concentration of material of economic interest in such a form, quality and quantity that there are reasonable and realistic prospects for eventual economic extraction. Mineral resources are subdivided in order of increasing confidence into inferred, indicated and measured categories.
Reserve	The ore reserve [33] is defined as the mineable material derived from a Measured and or Indicated Mineral Resource. A prefeasibility study must have been carried out, taking into account mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors
BEE	Black economic empowerment
LOM	Life of Mine
IPO	Initial public offering at a stock exchange
Capex	Capital expenditure
Opex	Operating expenditure
IRR	Internal rate of return
NPV	Net present value
JSE	Johannesburg Stock Exchange
LSE	London Stock Exchange
AIM	Alternative Investment Market on the London Stock Exchange
ASX	Australian Stock Exchange
mill	Million
JV	Joint venture

Market Cap	Market capitalisation
BOD	Board of Directors
MD	Managing Director
VP	Vice President
FD	Financial Director
OMS	Operations management system
Cu	Copper
Au	Gold
CV	Calorific value
Moz	Million ounces
ROM	Run of mine
Mt	Million tons
Mtpa	Million tons per annum
Zn	Zinc
THM	Total heavy mineral concentrate
DRC	Democratic Republic of Congo
RBCT	Richards Bay Coal terminal
GM	General Manager
BU	Business unit
Exco	The executive committee on a mine.
KPI	Key performance indicator
HQ	The mining company’s head quarters
OEM	Original Equipment Manufacturer
SHEQ	Safety, health, environmental and quality
H&S	Health and safety
HIRA	Hazard identification and risk assessment
SADEC	Southern African Development Community

CHAPTER 2. THE DYNAMICS OF THE RESOURCES INDUSTRY

2.1 Introduction

It is essential to understand the dynamics of the resources industry prior to the development of the game plan. One needs to bear in mind that these dynamics change continuously, with the rise and fall in demand of commodities. The game plan should be such that it can be applied to any environment. The purpose of this chapter is to gain an understanding of the current dynamics of the global, regional and national resources sector.

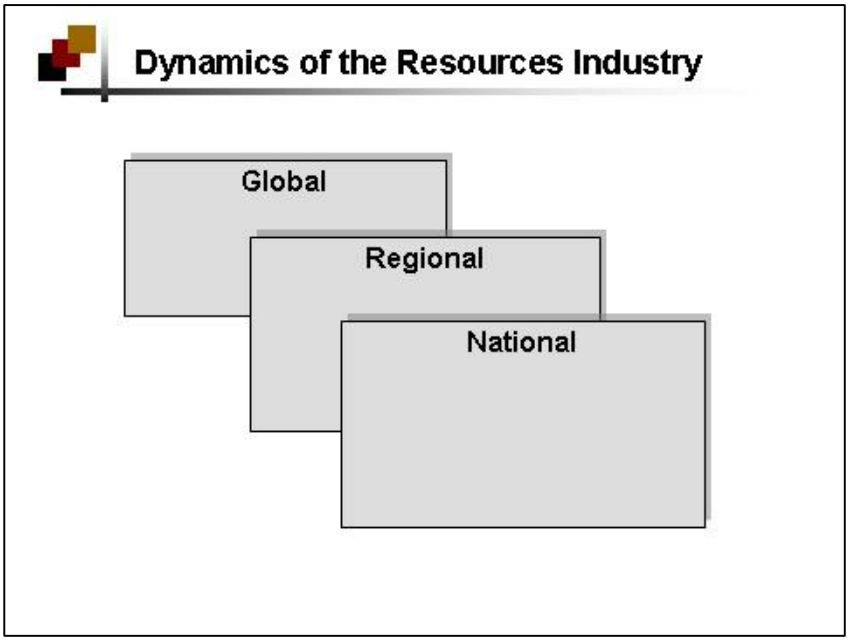


Figure 2.1 Dynamics of the resources sector

With reference to this thesis, the regional focus is Africa and the national focus is the South African resources sector.

2.2 Dynamics of the Global Resources Industry

In 1998, Heffernan [5] described the following trends affecting the resources industry:

Technological innovations had an integral part of recent discoveries. Developments in data manipulation, geophysics, geographical information systems, neural networks, remote sensing, global positioning systems and mobile phones, communication and sampling precision have increased the efficiency in exploration and reduced the overall costs and manpower requirements. New processing techniques for extracting minerals, such as heap leach technology have increased the range of exploration targets. With the help of this technology, low-grade bulk mineable gold deposits have become attractive exploration targets. The introduction of the new copper extraction technologies has enabled the mining of low-grade copper porphery deposits.

Changes in government policy and privatisation of state owned mineral properties occurred in various countries as a result of the collapse of the Soviet Union, which resulted in socialist policies being aborted and former socialist governments privatising mineral resources. Many mining countries changed their policies with a view to attracting mining investments and included the right to own mineral resources, the right to develop deposits, the right to sell product internationally, procedures governing payments for mineral exploitation, and state control over mineral resources.

National capital markets have become integrated into world financial markets, resulting in the **globalisation of capital.** Financing packages for mining ventures have become sophisticated and investors' knowledge about the risks associated with mining projects has increased as a result of improved global communications and transport.

The end of apartheid in South Africa has allowed South African mining houses to resume exploration in the rest of Africa, particularly gold miners who are plagued by increasing costs, declining productivity and shortage of working capital.

Environmental concerns in developed countries have forced mining companies to direct exploration budgets to developing nations where laws are more relaxed and environmental permitting and monitoring requirements are less stringent.

The decreasing mine-finding potential in Canada, Australia, the US and South Africa, countries which are well explored and mature, are forcing junior miners to focus on countries which do not have a long history of exploration and where there is a greater likelihood of finding big deposits.

In the period post-2003, the dynamics in the global resources sector were further affected by the following factors:

We are in the midst of an unprecedented **commodities boom**, where commodities have, since 2002 grown by about 23% each year, driven by urbanisation and industrialisation of major economies. Rapid urbanisation in China, with mass migration to urban areas means more buildings like houses and office blocks require extensive steel and building material. Should the growth in China decline, it will be offset by a burgeoning demand in India. Mawson [(6)] states that the growth surge of recent years cannot compare with the surge of ten years ago and that a base is created, from which prices will continue to rise, that is, a super cycle.

The mining industry is plagued by a chronic **shortage of skilled workers** and an ageing workforce. In 2006, Mineweb [(7)] reported that most young Canadians have no interest in mining or exploration careers, despite lucrative salaries and career opportunities. Across the globe, companies are competing for scarce mining skills.

The natural resources market has changed considerably since the terrorist attack which occurred in New York on **September 11**, 2001. The US and western democracies have declared war on the Al Qaeda network. Mining Finance Consultant Williamson [(8)] argues that the West will do all it can to reduce its dependency on middle eastern oil in order to reduce the cash flow to the region and thereby weaken the financing of the Al Qaeda

group. He argues that advances in technology and safety will make nuclear energy a realistic alternative to oil. In addition, Russia, with closer ties to the west and vast oil and under-exploited mineral reserves, will clearly benefit from this situation and greater mineral and oil production can be expected from this region.

The commodities boom is contributing to the growth in global exploration [9], as can be seen from Figure 2.2, which highlights how a higher gold price has contributed to increased exploration spending in 2004.

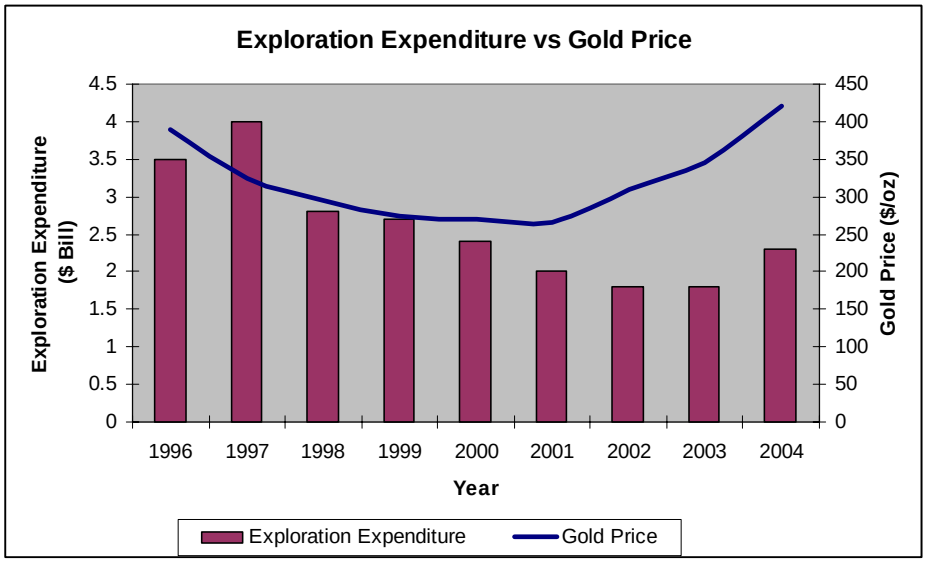


Figure 2.2 Exploration expenditure versus gold price

2.3 Dynamics of the Regional Resources Industry – Africa

2.3.1 Growing Global Importance of Africa [10]

Many corporate leaders regard Africa as an impoverished continent with little potential for growth. Arguments include:

- Africa accounts for only 10% of the world's population and 2% of global GDP.
- The continent fares poorly in globalization terms with Foreign Direct Investment having fallen from 10.6% to 7.5% in 2003.
- There has been an erosion of human capital from an immense brain drain.
- Africa ranks badly in terms of a corruption survey of 146 countries, with most of its countries between 75th and last positions.
- High transportation costs and small market size.
- Low agricultural productivity.
- A very high disease burden (malaria and AIDS).
- Adverse geopolitics: Africa has accounted for 75% of the world's most conflict-prone countries and 65% of global peacekeeping demand.
- Disregard for the protection of property rights.

However, Hale[10] argues that it would be wrong to ignore the continent for the following reasons: **Africa matters in the war on terrorism**. The US is deeply concerned about poverty-stricken and dysfunctional states falling under the control of terrorists and will make Africa far more important for US foreign policy. With declining birth rates and an increased ageing of the population, Europe is heading for a very high tax burden and a low rate of economic growth. Europe will have to attract large numbers of Africans to compensate for its population decline and global companies will shift production to Africa because of its younger population and large supply of labour.

Africa has a **treasure chest of minerals** that will contribute significantly to global commodity production in the future. Examples of global commodity holdings of African countries:

- South Africa: 88% of platinum reserves, 72% of chromium, 80% of manganese, 30% of titanium, 40% of gold , 44% of vanadium, 19% of zircon, 10% of coal, 10% uranium.
- Guinea: 33% of the world's bauxite
- Zimbabwe: 12% of world's chromium
- DRC: copper, cobalt, gold resources that have not even been measured

Africa is emerging as a global oil player, with the Nigeria, Equatorial Guinea, Angola and Gabon producing 3.4 million barrels per day. The US is importing 15% of its oil from these countries and it is expected to increase to 25%.

The character of the **global commodity market has changed due to China and this is benefiting Africa.** China has become the world's largest consumer of minerals. The country is adjusting its foreign policy to reflect its increasing need for raw materials and the US, Europe and Japan are going to have to compete with China for natural resource projects. Hale(10) sees Africa as one of the regions in which the competition for raw materials is likely to occur and a continent looking forward to new trading and investment opportunities with China. Roux (11) reports that China is funding the oil refining and petrochemicals sector in Angola to ensure that oil supply will keep up with its economic growth. The Chinese are also participating extensively in the development of other commodity projects on the African continent such as coal, base metals and platinum.

The **enthusiasm for Africa by Canadian and Australian juniors** is amplified by a comment from a senior executive of mining consulting company RSG Global at the Africa Down Under (12) conference in 2004 : "Africa is roaring with opportunity". With the backing of the Australian and Canadian stock exchanges, juniors are turning Africa's metals and minerals into account. Supported by the New Partnership for Africa's

Development (Nepad), these juniors are making abundant use of the pro-investor policies of many African countries.

Heffernan[13] attributes the new investment in Africa to **liberalised legislation and fiscal structures.** Countries that have emerged as secure countries for mining investment include Botswana, Ghana, Namibia, Tanzania and Zambia. The net result is that, despite African politics, government corruption, the judicial framework, HIV and AIDS, insufficient numbers of skilled people and poor geological maps, seven new gold mines have been discovered during the past eight years with a total of 55 million ounces, more than on any other continent. [14]

In terms of mining investment, Africa ranks third globally, at $13 billion for the year 2004, behind its major competitors Latin America and Oceania [15]. This equates to 15% of global mining investment. This is a significant improvement from 1998, when African mining investments were $4.4 billon, and the continent was positioned only before Europe, a continent with few mining activities [16].

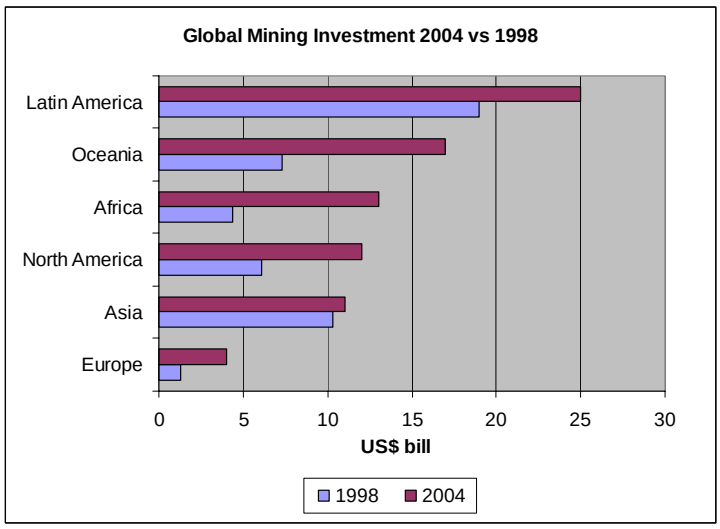


Figure 2.3 Global mining investments in 2004

2.3.2 Mining Investment in West Africa, the Copperbelt and Lake Victoria

On the African continent, most mining investment has been undertaken in projects and mines in the greenstone belts of West Africa, the Copperbelt in Zambia and the DRC and the goldfields of Lake Victoria in Tanzania.

In **West Africa, heap leaching technology has increased the potential gold deposit targets**. In 1998 these greenstone belts were under-explored and offered an excellent potential for low-cost gold production. The Sadiola Hill Mine in Mali, with oxidised gold mineralization offering free milling ore which is easy to leach, was the first big project to be launched. The success story of the mine has lead to many further exploration projects on the greenstone belt in Ghana, Mali, Niger, Burkina Faso, as well as the more politically unstable Liberia and Sierra Leone. (17)

The **copperbelt in Zambia and adjacent DRC has in recent years re-emerged** as a major copper producing region (18). In 2002, Anglo American, which had bought KCM, embarked on the Konkola Deeps Project. However, technical difficulties and a poor copper price put the project on hold, and in 2002 Anglo withdrew completely from the copperbelt. Since then, and facilitated by the boom in copper prices, several mid-tier and junior miners have established themselves in the region, taken over old nationalised and recently privatised assets, re-vitalizing mining projects and engaging in new exploration ventures.

Since 1998, **Tanzania has seen a new mine come into production every year** (19). This growth is attributed to the country's growing gold mining sector, the introduction of a new fiscal regime in 1997 and a new liberalised mining act in 1998. New gold mines include Golden Pride, Geita, Bulyanhulu, North Mara, Buhemba and Tulawake. A host of Australian, Canadian and UK junior miners are exploring the Lake Victoria region for gold deposits adjacent to these newly established mines.

2.4 Dynamics of the National Resources Industry – South Africa

The mining industry in South Africa is supported by gold, diamond, coal and platinum group metals and has for more than a century made an important contribution to the South African economy. [20]

In 2003 / 2004, South Africa's mining industry was characterised by **the introduction of new legislation supporting black empowerment,** sustainable development and mining reform. [21,22] The South African Minerals and Petroleum Resources Development Bill was passed in July 2002 and transferred control of all mineral rights to the state. The Revised Mining Charter, released in 2002, is a key element of the Minerals and Petroleum Resources Development Bill and provides for specific levels of Black ownership that SA companies must establish in order to address the distortions caused by apartheid. A minimum of 26% has been set for 2013. The charter also entails commitments by SA mining companies to education, training and opportunities for women in mining. Ever since the introduction of the bill, the mining industry has often been at odds with government. As a result of new legislation, there have been a host of high profile black economic (BEE) deals in the South African mining industry. BEE deals are a vital aspect of transforming South Africa's mining industry to a more equitable one, as well as changing South Africa from a purist capitalist society into an African nation. Some of the deals during the period of research included:

- Gold Field selling 15% of its South African gold assets to Mvelaphanda Resources
- African Rainbow Minerals was created through the merger of the platinum interests of the private company African Rainbow Mineral Holdings and Harmony Gold's Platinum interests with the non-gold assets of Anglovaal Mining.
- The sale of 26% of the South African operations of De Beers to a BEE consortium.

Many of the established major mining houses have displayed commitment to creating opportunities for black South Africans in the mining industry. However, there has been **widespread criticism of BEE** [22] , as the chief beneficiaries in mining deals to date have been a circle of favoured financial entrepreneurs with close links to the state, and deals

are not broad-based. A great challenge within this context is the attraction of foreign investment. Barclays Capital global head of mining and metals believes that attracting and retaining international capital to South Africa is becoming increasingly more difficult as international investors can only own ¾ of a mining asset and that the mood was more positive towards Burkina Faso, Ghana and Mali than towards South Africa.

Various **mining companies have diversified outside of South Africa**. To begin with, major mining houses, such as BHP Billiton and Anglo American moved their headquarters to London, the premier mining finance capital, in order to have easier access to mining finance. Some mid-tier gold mining companies have clear strategies to move outside of South Africa. An example is gold miner DRDGold [(23)], which believes that there are limited opportunities within South Africa, owing to the strong currency and the restructuring process that has taken place within the local gold mining industry.

Whilst deep level gold mines have been struggling in South Africa, **the platinum sector has grown extensively** [(24,25)]. With ever-increasing platinum prices, many Canadian and Australian junior miners have established themselves in the Bushveld complex and are developing platinum projects in partnership with BEE partners. These companies have increased the players in the market, which is dominated by the two major mining houses, Anglo Platinum and Impala Platinum.

The **true winners of the commodity boom in South Africa have been companies in the iron ore, base minerals and coal mining sectors**, commodities which feed the steel making process and power production which are driven by China's needs [(26)]. South African mining companies that are benefiting from the surge in these commodities are BHP Billiton, Kumba Resources and Metorex.

In South Africa, the **energy crunch is increasing the importance of coal** [27] , where 70% of the coal is consumed locally and the remaining 30% is exported worldwide. Growing infrastructure demands as a result of the establishment of a new black middle class in South Africa, requires increased energy, and coal is the primary source of energy. Large mines owned by large mining companies Anglo Coal, Exxaro, Sasol and BHP Billiton currently produce 87% of the country's coal, but the future lies in coal mined from smaller mines as the large reserves from the Witbank coal field are being depleted. Reserves in the Waterberg coalfield have yet to prove to be a viable alternative with a lack of infrastructure, distance from export harbours and depth of mining.

The South African government has set its **focus on the beneficiation of minerals** [28], in order to create more value from minerals before they are exported, as well as to add jobs to the economy. This forms part of the Minerals and Petroleum Resources Development Act and is to be promoted in the Beneficiation Bill. Many mining companies are, however, sceptical of the drive for beneficiation as they believe beneficiation is not their core competency and legislation may not be the best measure to get mines to beneficiate.

In South Africa, the **junior mining sector has operated in a challenging and competitive environment.** Noah Greenhill, JSE Business Development Manager [29], refers to the poor support of the South African exploration sector over the last decades as the local market has inherited an attitude of scepticism owing to the historical misconducts of the junior mining houses. This has lead to the decline of junior mining houses on the JSE, based of the perception that juniors cannot raise money in Johannesburg and, as a result, there are more juniors listed on the London and Toronto stock exchanges than on the JSE. There are 1200 junior mining houses listed on the Toronto Stock Exchange, whereas there are only 56 companies listed on the JSE, which include mostly blue-chip mining giants. Greenhill is actively working on changing these perceptions and attracting juniors to the bourse, emphasizing that Africa is a resource-based continent and South Africa, as the economic heart of the continent, should be the mining capital. There is criticism from various sources that South African juniors are not active on the African continent. It is rather the Australian and Canadian juniors,

supported by their stock exchanges, which are able to heed the call of the African continent. It is through Greenhill's drive that the JSE will be able to mirror the ASX and TSX junior listings.

Despite the various changes and challenges, **South Africa remains a leader in terms of mining investment in Africa** [30]**.** The country alone hosted almost half of the investment projects in Africa in 2004 with US$ 7.4 billion and was the fourth most important investment target globally, with 7% of total mining investments.

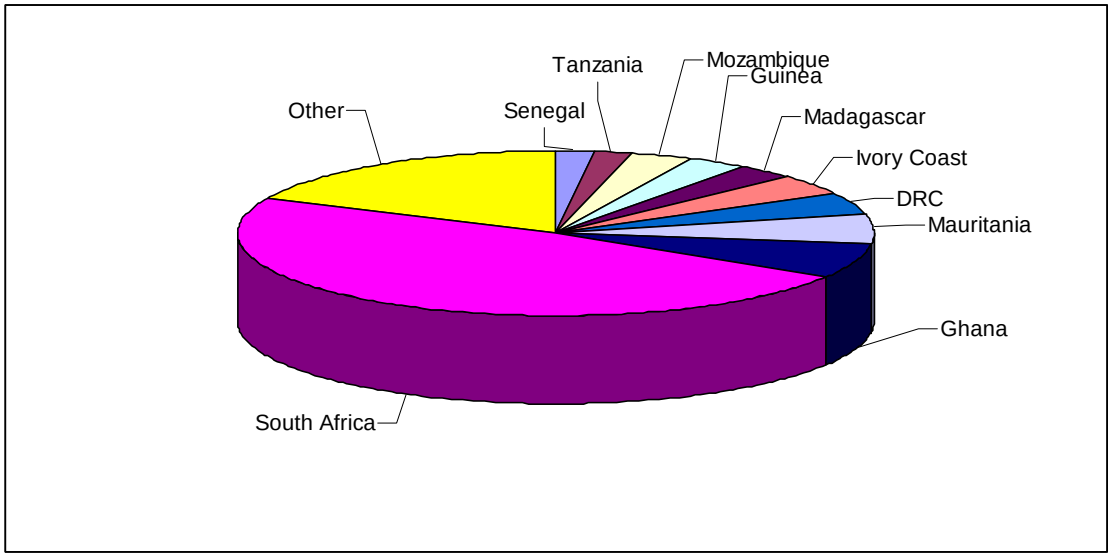


Figure 2.4 Mining investments in Africa in 2004 by country

2.5 Summary

2.5.1 Summary of the Dynamics of the Resources Sector

This chapter has sought to provide the overall dynamics of the global, regional (African) and national (South African) resources sector, which are displayed in Figure 2.5.

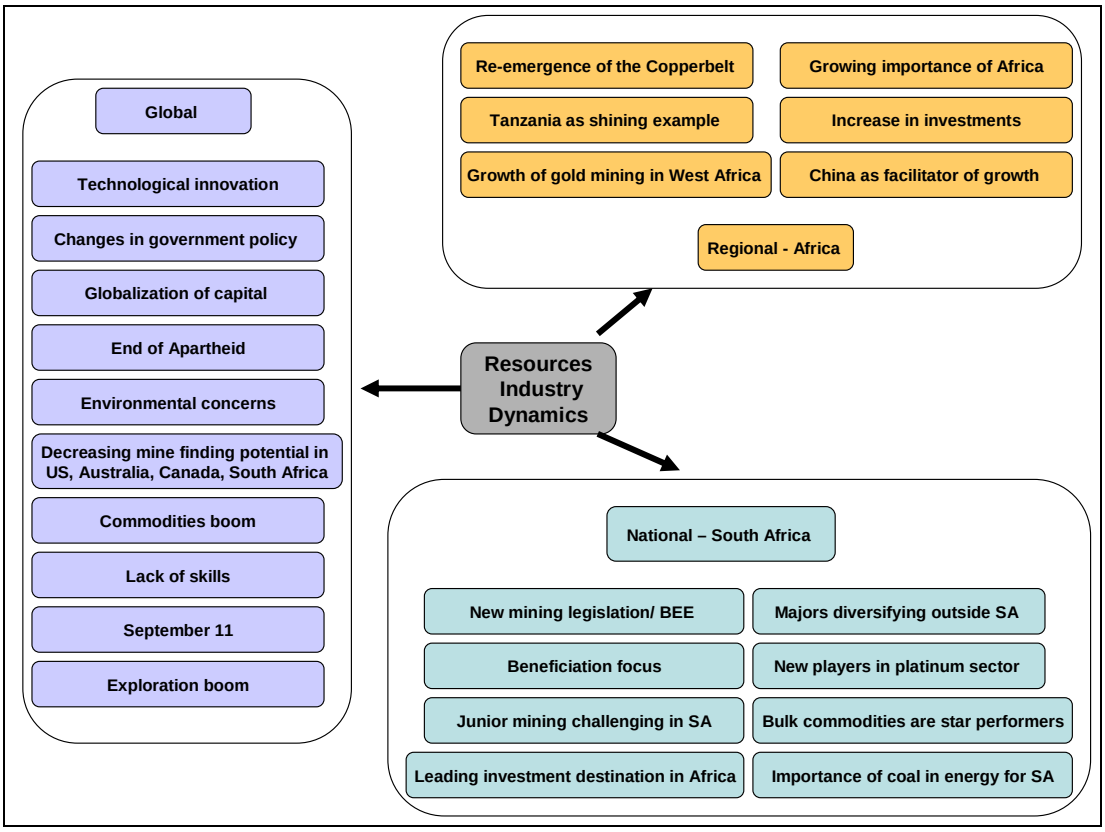


Figure 2.5 Resources industry dynamics

Globally, the resources sector is affected by technological innovation, changes in government policy and privatisation of state-owned mineral properties, globalisation of capital, the end of apartheid in South Africa, growing environmental concerns, the decreasing mine finding potential in Canada, Australia, the US and South Africa, the effects of September 11, a commodities boom and the resultant growth in exploration and a lack of skills.

In Africa, the dynamics are the growing global importance of Africa which is attracting global investment, growth in gold mining in West Africa, the re-emergence of copper mining in Zambia and the Democratic Republic of Congo, Tanzania as a shining example of success and a Chinese invasion of the continent.

In South Africa, new mineral legislation and the requirement for black economic empowerment, major mining companies diversifying outside of South Africa, new players in the platinum sector, an extremely well performing bulk commodity sector, an energy crunch increasing the importance of coal, a challenged junior mining sector and a beneficiation focus are key factors affecting the industry. Despite various challenges, South Africa is the leading mining investment destination in Africa.

2.5.2. The Significance of the Industry Dynamics on the Game Plan

The significance of this analysis to the game plan development is that the game plan needs to be generic to cater for constantly changing dynamics of the industry. At any point in time, new factors may emerge at a global, regional or national level, which may affect the business of a junior mining company. The dynamics presented herein present a snapshot of the resources industry of the period 1995 to 2007. Currently, a highly dynamic and competitive industry, driven by the growing economics of Asia, a shortage of capacity, has lead to the importance of Africa, as it hosts minerals in abundance. As we progress through the 21st century, new factors may evolve, such as the shortage of energy, the focus on climate change and renewable energy and the shortage of water. Again, this will change the dynamics on the global, regional and national levels. Thus, the game plan needs to be flexible enough to cater for the constant changes of these dynamics and to facilitate a blue print that will enable a junior mining company to emerge as a winner in any environment.

CHAPTER 3. GAME PLAN DESIGN AND LAYOUT

3.1 Introduction

The purpose of this chapter is the development of a game plan design and layout. The guiding philosophy is that the game plan should be user-friendly and accommodate the constantly changing international, regional and local resources industry dynamics. It must be generic enough to enable players from different commodity sectors to use it. In drawing up a game plan for mining ventures, the author has drawn on the games of soccer and chess, with a view to extracting key elements for the game design.

- The player of the game is the soccer team and the club behind the team, whose mission it is to win the games and ultimately the championship by scoring more goals than the opponent. In the game of chess, it is the chess player.
- The foundation of any game is the rules and constraints. The game of soccer is 90 minutes long, half-time is after 45 minutes, there are 11 players per side, the ball may only be played with the foot and head, and there are specific rules such as 'offside'. The game of chess has rules and constraints determined by the board, the thirty two men, the moves specified for the respective chessmen, king, queen, rook, bishop, knight and the pawns, and the rules of 'castling' and 'checkmate'.
- The assets in the game of soccer are the team, the players, the coach, the management team, the soccer grounds and the supporting fans. In the game of chess the most important asset is the king, followed by the queen, which has the greatest powers on the board.
- Each team has a strategy, as well as a tactical plan, on how to play the game, which is devised by the club managers and the coach. To execute the game plan, the team needs to draw on a fearless goal keeper, strong defenders, midfielders with skill and stamina, and fast, skilful forwards and strikers. During the game the ball passes from player to player, from defence to strikers to midfielders many times before it lands in the goal. Equally, every good chess player will have a specific strategy to capture as many chessmen as possible and checkmate the king.

- Outside influences impact significantly on the team's performance, such has playing in a stadium full of pro-team supporters, the purchase of a star player, a new club stadium amongst many others.
- In the game of soccer, benchmarking is done in the form of playing against other teams in a league. Goals shot, and points secured are ultimately tallied at the end of the season to determine the champion team. In chess, it is playing against one another.
- Despite the set of rules, every game is unique. On any day, the underdog can beat the champion team. This is what attracts millions of spectators worldwide to the game. Likewise, every game of chess is unique and new plays and strategies are still being evolved.
- The games of soccer and chess have been played for generations, on all continents and by diverse societies. Despite this, the game fundamentals remain the same.

The fundamentals of the games of soccer and chess can be applied to the development of a game plan for junior mining ventures:

- **The player of the game:** the junior mining company.
- **The foundation:** the unique elements and set of rules and constraints pertaining to the mining industry, with particular reference to characteristics of the industry, company management and financial performance.
- **The assets:** the exploration project, feasibility study, mine development project or operating mine.
- **Strategy and tactical plan:** these are defined by the pillars of strategy development, legal and financing, operations management and risk management. The pillars are made up of steps and tasks and use models and matrices as guiding principles.
- **Outside influences:** are those resulting from the dynamics of the applicable global, regional and national resources industry.
- **Benchmarking:** databases will provide benchmarks from which the player can draw information for the strategic and tactical plan, that is, the pillars.

- **Scoring:** is done by providing the junior mining company with a final investment game score, which will allow junior mining companies to be able to be rated against one another.
- **Uniqueness:** each junior mining company and venture is unique, whether this is a coal, gold, platinum or base metal venture.
- **Fundamentals:** The game of junior mining has been played for 100 years by entrepreneurs starting from the gold rushes of South Africa, Australia and Canada respectively in the early 1900s right up to modern times, with sophisticated juniors listed on the stock exchanges of Toronto, Australia, London and South Africa. The game fundamentals of junior mining remain the same, wherever the game is played.

The elements of the game plan for junior mining companies are depicted in Figure 3.1, and will be discussed in detail in the following chapters.

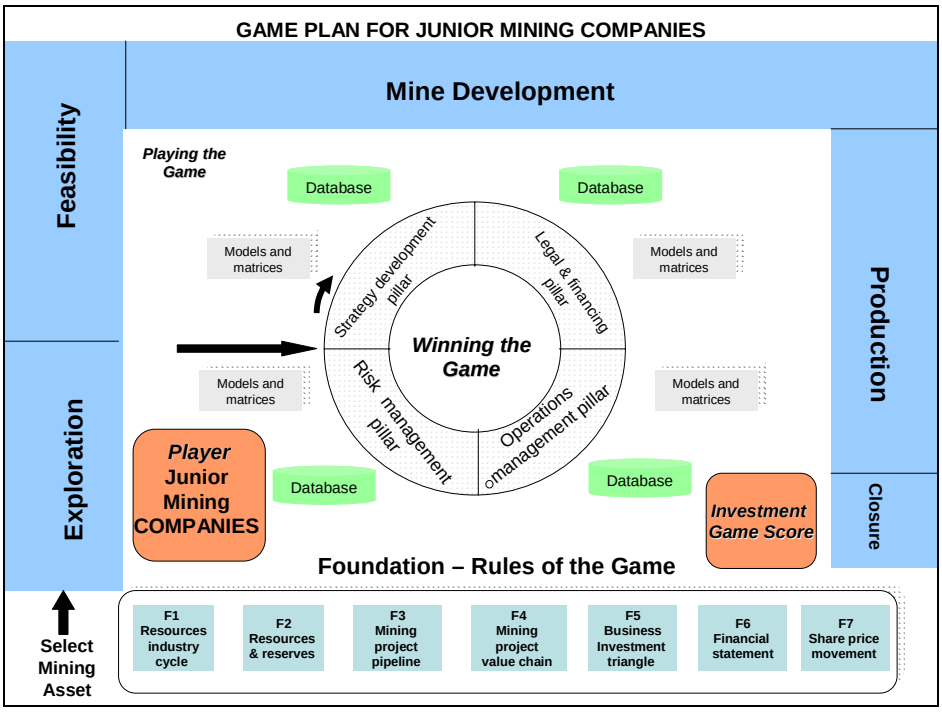
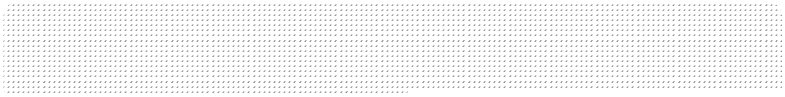


Figure 3.1 Strategic and tactical game plan for junior mining companies

3.2 Foundation – Rules of the Game

The foundations of any game are the rules of the game. These are non-negotiable and set the scene, perimeters and constraints for the game. The foundation, that is, the rules of the game for junior mining companies, is discussed below:



incentives for exploration in Canada. New discoveries followed and the boom gained momentum with several major discoveries such as the Sadiola Hill gold find in Mali and the Voisey Bay nickel deposit in Canada. In 1997, the international resources industry was dealt a heavy blow after the revelation of the fraud at Bre-X Minerals' Busang gold property, which put the credibility of the junior mining sector into question, resulting in a 36% plunge in mining listings that set global booms and busts into motion. Triggers can be either global or national. Heffernan has depicted the boom and bust cycle in the exploration clock (Figure 3.3).

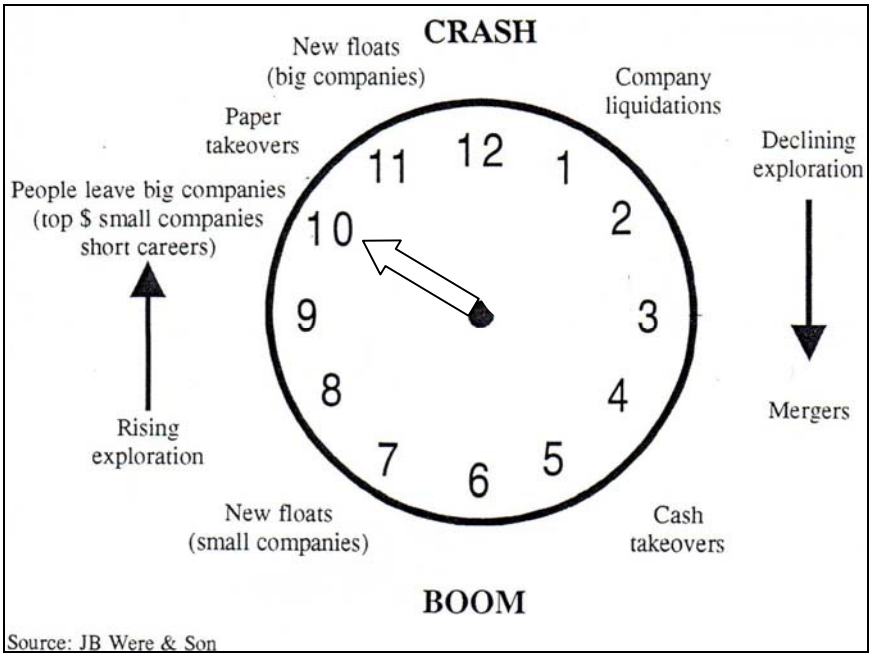


Figure 3.3 The exploration clock

The author believes the hand is now at 10 o'clock, a period of new floats and rising exploration, as a result of increase in demand for minerals from China and India. According to the clock, paper takeovers and new big floats are on the horizon, to be followed by company liquidations and declining exploration.

3.2.2 Foundation 2: Resources and Reserves

The concept of resources and reserves is an integral concept of the resources industry.

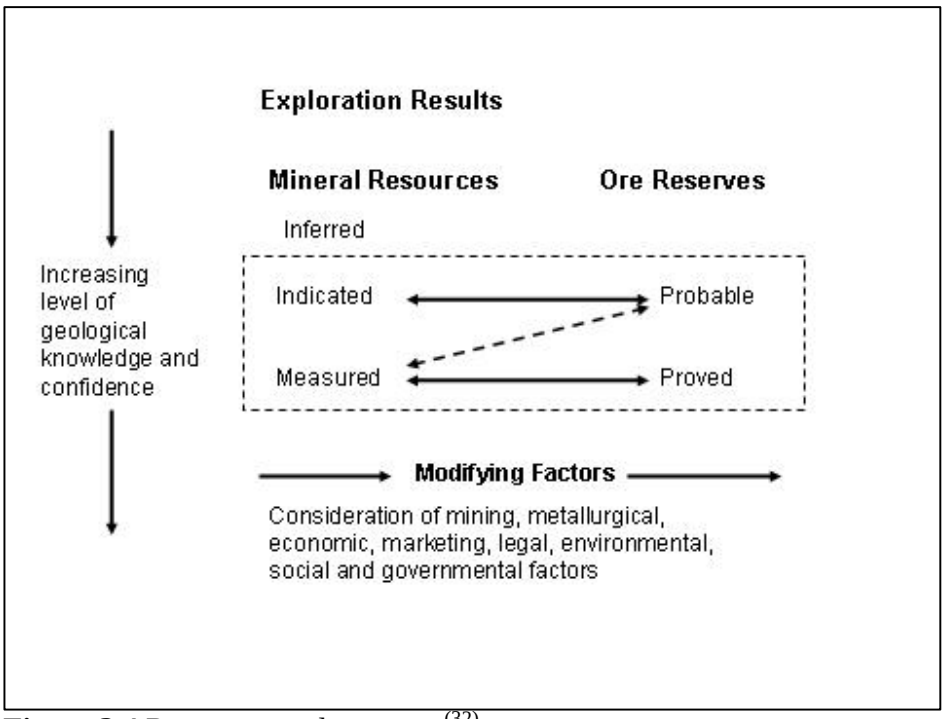


Figure 3.4 Resources and reserves [32]

Any orebody starts at a level of a mineral resource[33], which is defined as a concentration of material of economic interest in such a form, quality and quantity that there are reasonable and realistic prospects for eventual economic extraction. Mineral resources are subdivided in order of increasing confidence into inferred, indicated and measured categories.

The ore reserve is defined as the mineable material derived from a Measured and/or Indicated Mineral Resource. A pre-feasibility study must have been carried out, taking into account mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors.

2.3 Foundation 3: Mining Project Value Chain

The Mining Project Value Chain (MPVC) [34] is a concept that is extensively used in mining investment and mine development circles as it encompasses various key aspects that are generic to all exploration and mining projects, regardless of which commodity is being pursued. Hence the author regards this concept as one of the foundations of the game plan.

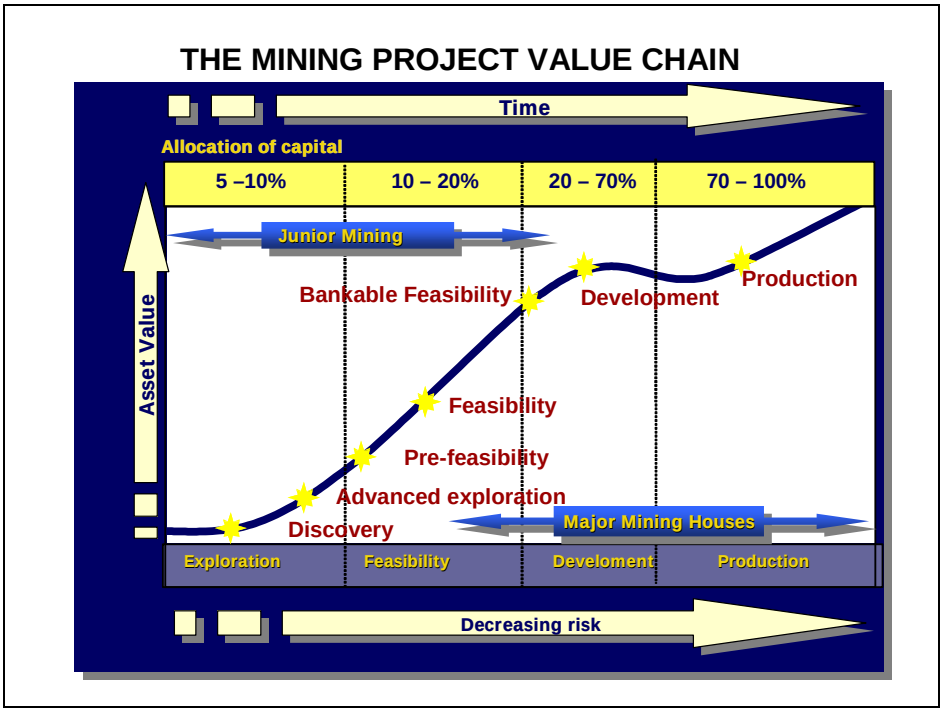


Figure 3.5 Mining project value chain

Project progression: The base line of the MPVC is the route along the value chain from exploration, feasibility, development to production. A mining project value chain commences with the initial discovery of minerals, followed by advanced exploration. The data of exploration is used to conduct the feasibility stage, which takes the project through the pre-feasibility, feasibility and bankable feasibility stages. The development stage commences once the mining project has been given the go-ahead for implementation. Once the mine has been developed, that is, constructed and commissioned, production commences. Key characteristics of the MPVC are as follows:

Asset value: The asset value of the mining project increases rapidly from the exploration stage to the bankability stage. Thereafter, the asset value flattens, even decreases, as the project now needs to meet the expectations of the investors. Only once production commences does the asset value curve grow.

Risk: The risk of the mining project is highest during the exploration stage and decreases as the project moves from exploration, feasibility, and development to production.

Capital allocation: Only 20% of the capital is spent up to the bankable feasibility stage, as this is the high risk zone of the MPVC. As the risk decreases, capital expenditure increases, with 80% of the capital being spent during the development and production stages. The bulk of the capital (50%) is spent during the development stage.

Junior and major mining: The MPVC highlights the different playing grounds of junior and major mining companies. Junior mining companies are active in the high risk zones of exploration and feasibility. This zone requires the least capital and presents the opportunity of highest asset value growth. Major miners play in the higher capital, lower risk and lower asset value growth zone of development and production.

3.2.4 Foundation 4: Mining Project Pipeline

The mining project pipeline is a significant foundation element in the junior mining sector. The pipeline demonstrates that only very few exploration projects translate into an operating mine. The mining project pipeline can be displayed as a triangle. The example of Randgold Resources[35] highlights that Randgold's portfolio comprises 108 geological anomalies, 47 exploration targets, 12 feasibility projects and 2 mines.

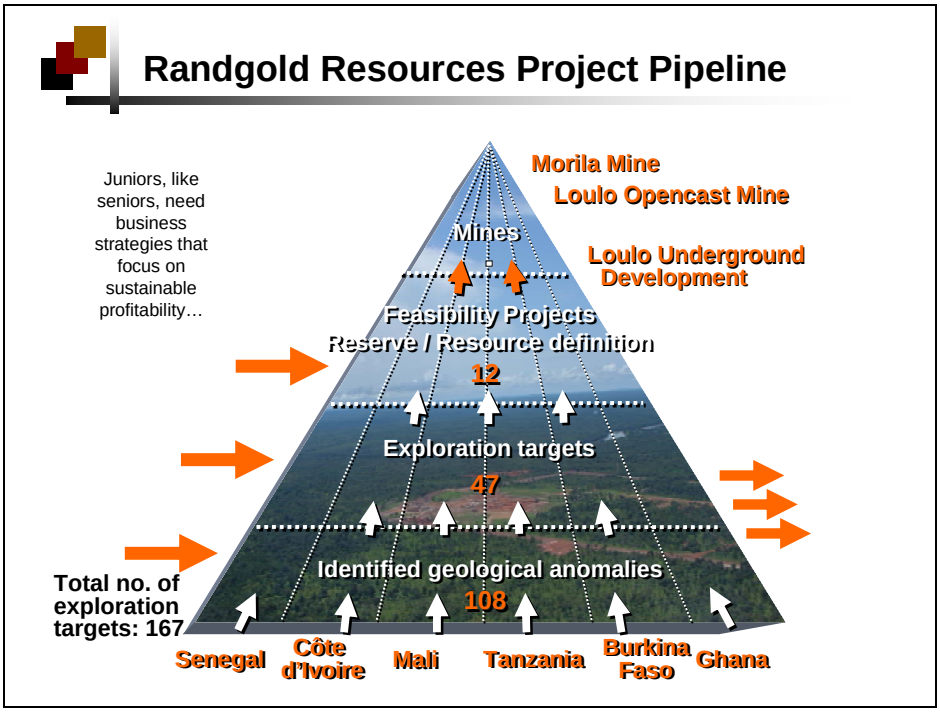


Figure 3.6 Randgold Resources project pipeline

With reference to junior mining, Buchanan [36] argued that a junior company would set itself one hundred generative targets within a certain commodity. Of these, twenty exploration targets would materialize, that is, the company would undertake exploration on twenty different projects. Of these twenty exploration targets, only two would be evaluated. From the evaluation phase onwards, major mining companies would begin to take over the project in order to bring it into a pre-feasibility stage and beyond.

Simplified, a generic mining project pipeline is demonstrated in Figure 3.7. The author believes, from experience, that the ratio is 1000 identified geological anomalies to 1 mine. This should be used as a benchmark for junior mining companies playing the game.

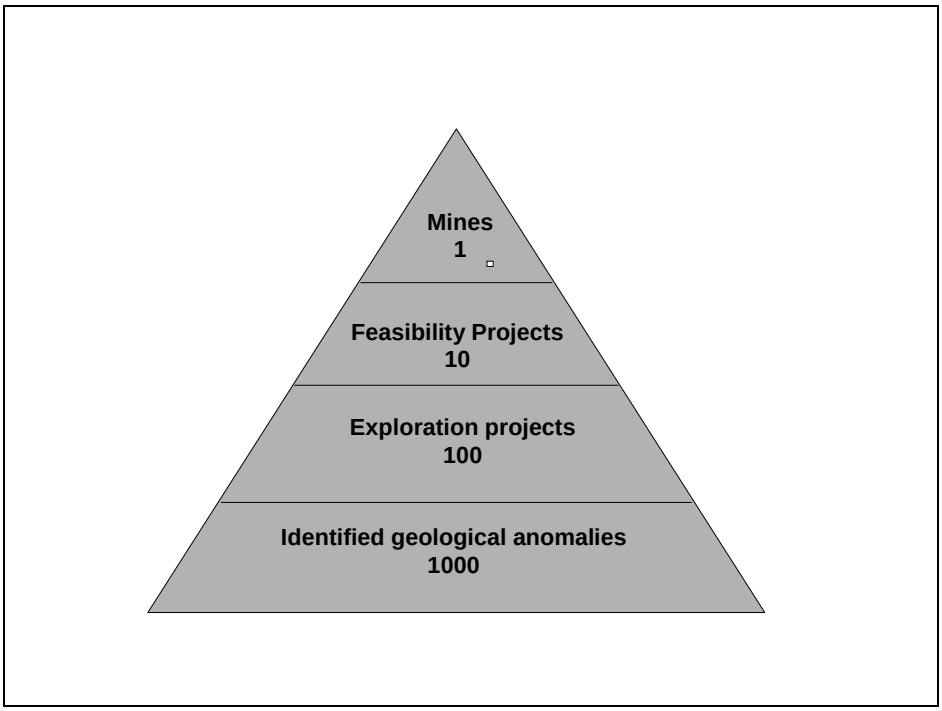


Figure 3.7 Generic mining project pipeline

3.2.5 Foundation 5: The Business Investment Triangle

Kiyosaki [37] refers to the business investment (BI) triangle (Figure 3.8) as a benchmark for assessing the foundation of a company in which he is interested in investing. All elements of the investment triangle need to be covered in order for the company to be able to turn an idea into an asset and ensure growth and profitability. If the business is to be successful, the entire triangle needs to be strong and interdependent.

Whilst this concept is generic, the author believes the concept applies equally to junior mining companies and it needs to feature in the game plan as part of the foundation. The concept is as follows:

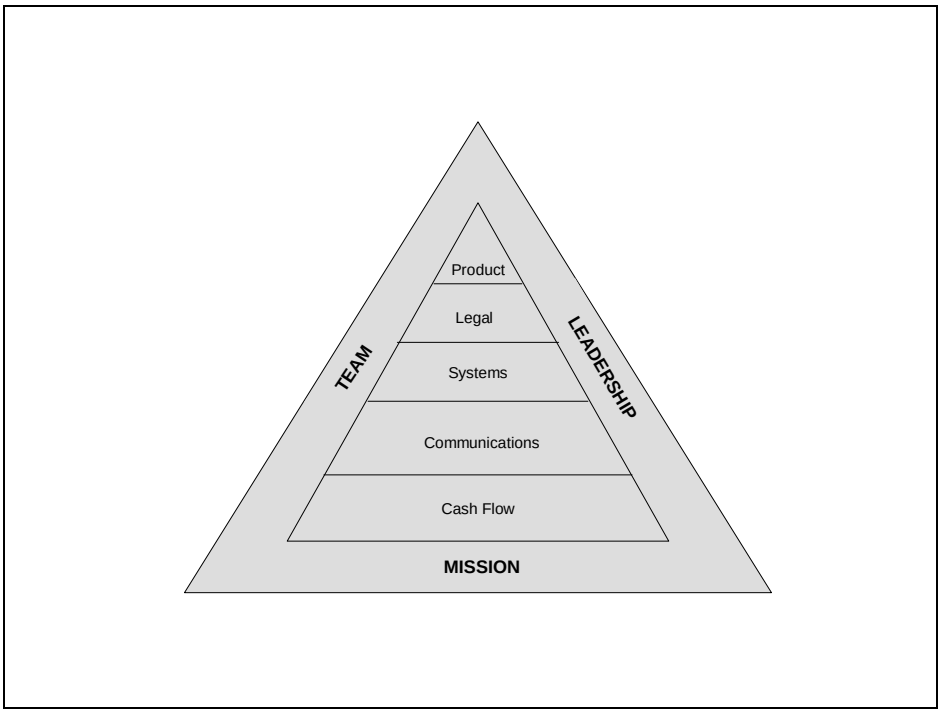


Figure 3.8 The business investment triangle: Rich Dad's Guide to Investing (2000)

Mission: Every company needs a business mission to be successful. This helps maintain focus. The focus of the team should be serving and fulfilling the business's mission.

Team: Business is a team sport, where success comes from taking "tests" as a team, not as an individual. The team comprises different types of people with different skills coming together to work in a junior mining company. The team includes entrepreneurs, geologists, mining engineers, metallurgists, promoters, financial and legal experts, investors, key operational staff, consultants and contractors.

Leadership: Leadership is vital for the company's success. The leader's job is to bring out the best in people, provide direction and support, take tough business decisions, keep the team focused on the corporate mission and inspire the team. Strong leadership is required in the risky business of mining, where large amounts of capital are required and team work is integral for success.

Cashflow: Cashflow is extremely important to ensure that the business exists and is financially viable. Cash flow management is a fundamental and essential skill in any business. Many junior miners are not cash generators and require constant capital raising to ensure enough cash flow to sustain their exploration, feasibility and mine development initiatives. Only once a mine is operational does the company generate cash from operations.

Communication: Any successful business needs successful internal and external communication. Internal communication is that of open communication channels for supervisors, staff, team leaders, senior management and board of directors. External communication is aimed at investors, suppliers, customers and affected parties. Mining companies often appoint public relations companies to handle communication with external parties. Companies, once listed, are required to communicate constantly their latest project results to satisfy investors, as well as to liaise continuously with affected communities.

Systems: A business is a system of inter-operating systems. Key in mining are financial and operations management systems. Individuals within a company must be accountable for each of the systems and a director must be in charge of making sure all systems operate to their highest capacity. Investors invest in good systems and people who can build good systems.

Legal: Legal advisors are some of the most important advisors to a mining company. Legal documents can be the seed of a worldwide business or, if not attended to correctly, spell the failure for the business. As junior mining is an international business involving partners from various continents, contracts are complex and often take months to complete.

Product: The most important part of a new business is not the product but the system behind the product or idea. The product is the expression of the business's mission, while the rest of the investment triangle lays the foundation for long-term success of the

business. The product in junior mining is either the mineral commodity being produced or the exploration project, feasibility study or mine being developed.

3.2.6 Foundation 6: Financial Statement

Junior mining is based on a capitalist system, and, ultimately, investors and entrepreneurs pursue this business for financial returns on investment. Investors and analysts review the annual reports of junior miners diligently and many focus mainly / only on the financial statement of the company so as to make an assessment of the viability of the company as an investment proposition. Thus, financial statements (see Table 3.1) form an integral part of the foundation of the game plan.

Table 3.1 Example financial statement

Income statement (R mill)	year 2	year 1
Revenue	100	80
Cost of sales	90	75
Gross profit	**10**	**5**
Net profit before tax	**5**	**2**
Profit/loss for year	**4**	**1**
Earnings per share (R)	0.1	0.02

	Shareprice	1.00
Balance sheet (R mill)	year 2	year 1
Current assets	10	5
Non current assets	35	25
Total assets	**45**	**30**
Current liabilities	30	20
Non current liabilities	5	5
Total liabilities	**35**	**25**
Total equity	**10**	**5**

Cashflows	year 2	year 1
From operating activities	100	80
From investing activities	-20	-10
From financing activities	10	10
Cash at year end	**10**	**5**

Ratios	year 2	year 1
Gross profit margin	10%	6%
PE ratio	10	
Current ratio	0.3	0.3
Debt ratio	78%	83%
Gearing	33%	50%

The financial statement consists of the following:

Consolidated income statement: This entails a summary of revenue and operating costs. This leads to gross profit, and after deduction of other expenses, net profit before tax. After tax payment, one is left with a profit / loss for the year. The profit / loss is divided by the issued shares and results in earnings / losses per share.

Consolidated balance sheet: The consolidated balance sheet entails total assets which comprises current and non-current assets. Likewise, the total liabilities comprise current and non-current liabilities. The total equity is the total assets minus the total liabilities.

Cashflows: This is a reflection of the cashflows from operating, investing and financing activities. The cash at the end of the financial year reflects the money available to the junior mining company for the next financial year.

Ratios: Mining investors quickly sum the investment by compiling five key ratios:
Gross profit margin = gross profit / sales
P/E ratio= market price per share / earning per share
Current ratio = current assets / current liabilities
Debt ratio = total liabilities / total assets
Gearing =long term liabilities / total capital employed

3.2.7 Foundation 7: Share Price Movement

Many junior mining companies are not profitable and a key financial measurement for investors in this game is the share price. The share price reflects the market sentiment and rises as the demand for the share increases, as new positive results of the company are presented or anticipated. Equally, if negative information about the company is presented to the market, investors want to sell the shares in the company and the share price drops. Consequently, the share price is a key foundation of the junior mining game and reflects

the health of the company. Figure 3.9 [38] represents the share price of junior mining company Anvil Mining over a 19 month period and tracks it against the Dow Jones Global Exploration & Mining Index (April 2006). Also, below the share price movement, the corresponding volume of shares traded is depicted.

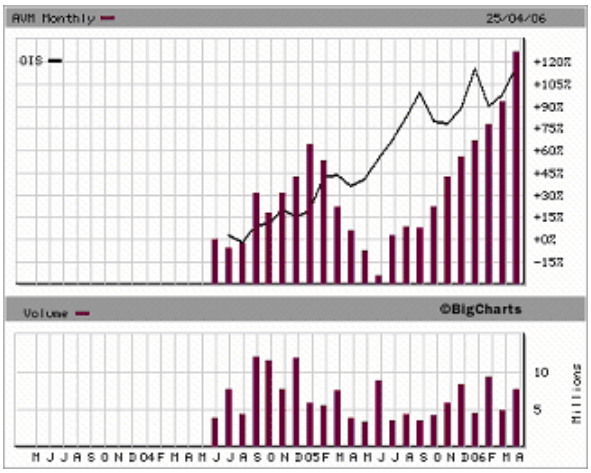


Figure 3.9 Comparison share price Anvil vs.Dow Jones Global Exploration and Mining Index

3.2.8 Summary of the Foundation

The foundation represents the unique set of constraints and the rules applicable to the junior mining company. The resources industry follows the boom and bust models of the exploration clock. In periods of boom, mining assets are expanded and developed, and in periods of bust, there is a contraction of development. The player needs to be aware of the period in which he is playing, as strategies differ for boom and bust. A key constraint is that of confidence in the asset as reflected in the resource and reserves statement. The higher the degree of confidence in the mining asset, the lower the perceived risk and the more money can be raised.

The asset follows a natural progression, from exploration, to feasibility, mine development and production, a process defined in the mining project value chain. The

chances of an exploration project turning into an operating mine are very slim, a constraint defined in the project pipeline. Hence, many junior miners do not play in the game of producing mines, but rather in that of exploration and feasibility studies.

In order to develop the mining asset, the junior mining company needs a mission, a team that is lead correctly, cashflow, strong external and internal communication channels, sound systems and strong legal contracts, all factors defined in the Business Investment Triangle.

The financial statement and share price movement will reflect the industry cycle, the mining asset and its probability of success, the resources and reserves and how the elements of the business investment triangle within the company are working together.

3.3. The Player - the Junior Mining Company

Players in the resources game are major and junior mining companies. For purposes of this research, the player is the junior mining company pursuing the game.

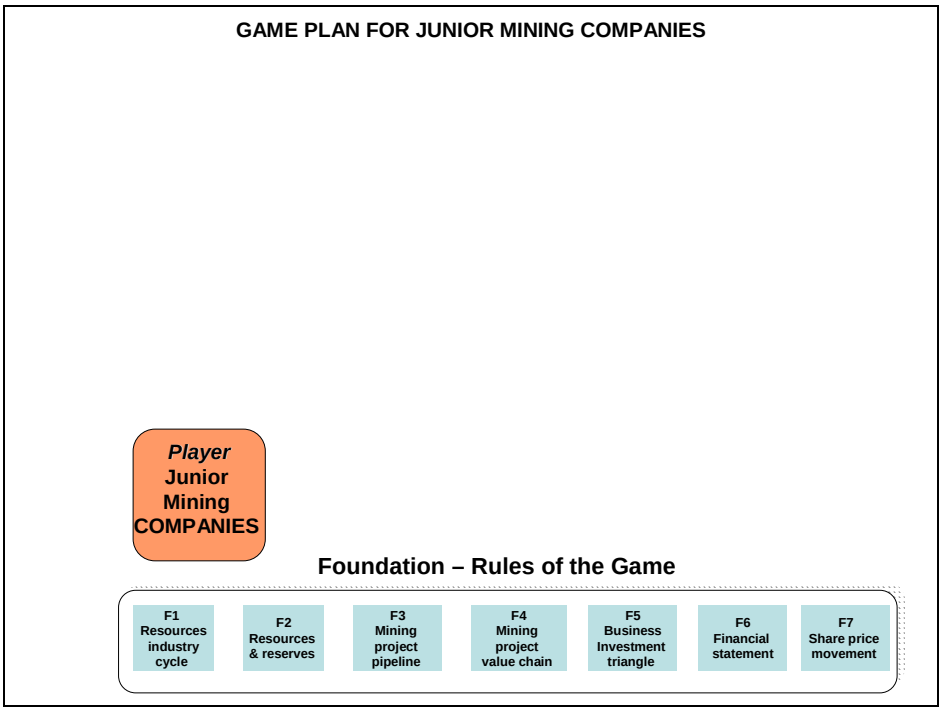


Figure 3.10 The player - the junior mining company

Heffernan[39] describes major mining companies as those companies with established assets, earnings records and credit ratings which generate revenues from producing mines and arrange financing through traditional market channels, such as underwriting, private placements of debt, sales of common or preferred shares: companies such as Anglo American, BHP Billiton, Rio Tinto, Newmont, Noranda and Phelps Dodge.

On the other hand, junior mining companies are small companies whose principal activity is exploration and mine development activities. They have few assets and less than 25 employees. These companies tend to be entrepreneurial, free from bureaucracy and are able to capitalise on exploration opportunities quickly and efficiently. This category includes 1000s of companies from individual prospectors to small producers. Once the

companies find viable orebodies, they sell all or part of the project to senior companies with more advanced technical, financial and marketing skills. Most junior mining companies are based in Canada and Australia.

The brainpower behind the junior mining company is a group of risk-taking mining entrepreneurs who constitute the board of directors and management team. These individuals, who have conceptualized the company may be likened to mavericks at times, willing to stare adversity in the face, willing to spend significant time in hostile environments, whilst also having to play the polished corporate game in the global mining cities when promoting their company and raising capital. The brainpower behind the player is also often the mining investor who is willing to punt the junior and the team behind it, with a healthy appetite for the high risk – high reward game of junior mining.

For purposes of this thesis, the junior mining companies are described similarly to the way they report in their annual reports to shareholders:

- **Corporate profile:** This is a brief description of the company's background, corporate structure, and major shareholders. Should the company be listed, listing details, shares trading, the share price and market capitalization are included.
- **Company strategy:** The vision and mission of the company and its corporate strategy.
- **A review of mining asset:** Mining operations, mine development projects, feasibility studies and exploration projects, project locations and an overview of the portfolio on the mining project value chain.
- **The team:** This includes the Board of Directors and the management team. Experiences and qualifications are reviewed.
- **Corporate governance practices**: Structures in place to ensure adequate corporate governance.
- **Finance:** Financing in terms of equity and debt financing, a summary income statement, balance sheet and cashflow statement, as well as key financial ratios.

The mining asset is developed in stages from exploration, feasibility, and mine development before it eventually leads to a producing mine. Any stage of the mine development process represents the mining asset of the junior mining company.

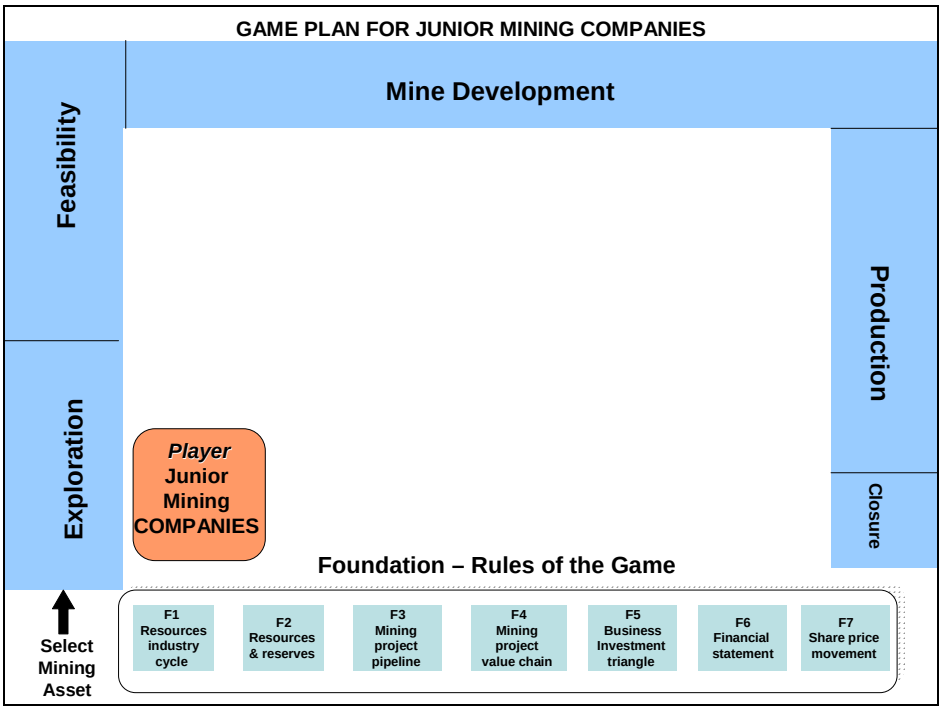


Figure 3.11 Game plan development – mining asset

The project's stages described below were presented by Seeger (1999) [(40)].

3.4.1 Stage 1: Exploration

Most junior mining ventures start out as a private group of geologists and mining professionals with an exploration concept. Financing is usually through an informal association of friends or venture capitalists who put up seed capital for exploration. Once the Prospecting Permit has been obtained, target generation commences, with a review of regional and project-specific technical information available on the project. The purpose of this exercise is to rank the projects and identify the most prospective opportunities. This exercise takes between 2 to 3 weeks to complete. Once the most prospective projects

have been identified the field survey can commence. This includes geological mapping, geochemical and geophysical surveys and trenching. Promising results will lead to a phased drilling campaign in order to define the resource. Drilling should provide sufficient information to classify the deposit as an inferred or indicated mineral resource. The data obtained would be incorporated into a geological model. Depending on the type and complexity of the deposit, this stage can take between 3to 6 months to complete.

3.4.2 Stage 2: Feasibility

This stage has two components, the pre-feasibility study and the feasibility study.

i) Pre-feasibility Study

The pre-feasibility study involves further drilling in order to define the grade and tonnage of the mineral resource. This is done in order to justify further expenditure on the project. The basis for any further project development is a valid ore-reserve and geological information needs to be confirmed before any work can proceed. The step following the establishment of the ore-reserve is the development of a production schedule, which takes into account the reserve tonnage and market demands. The production rate should be highly significant, as it determines the mine life, capital costs and operating costs of the project. A typical pre-feasibility study should contain information and an analysis in the following areas:

- ✓ Project description
- ✓ Geology
- ✓ Mining
- ✓ Processing
- ✓ Other operating needs, such as water, energy and spare parts
- ✓ Transportation
- ✓ Towns and related facilities
- ✓ Labour requirements
- ✓ Environmental protection
- ✓ Legal considerations
- ✓ Economic analysis

In order to obtain this information, the responsible junior mining company would secure consultants to conduct preliminary studies in the above-mentioned fields. The tested

method that investors use to analyze the potential success or failure of a project is the cash-flow analysis that is summarized in a number of factors or ratios. The most common economic measurements are the Net Present Value (NPV) and Internal Rate of Return (IRR). The margin of error for the pre-feasibility study is 20%. If the project is financially attractive, it has a positive NPV and meets the IRR hurdle rate set by the investor, which is usually greater than 15-20%.

ii) Feasibility Study

The feasibility study is a refinement of all assumptions and design parameters of the pre-feasibility study. This requires the technical and financial feasibility of the mine to be developed with a reduction of margin of error and is essential to support the decision to proceed with or abandon the project. Usually, the assumptions need to be $\pm$10% correct.

The drilling campaign is extended to obtain more accurate geological information and mineral grades, which would enable the reserve to be classified as a measured mineral resource and increase investor confidence. Pilot plant trials are conducted on site to obtain technical data for mining and beneficiation. Specialist studies are undertaken to determine the social and environmental impact of the project. In-house and external consultants undertake further research in the fields of mining, beneficiation, marketing, infrastructure, transport and human sciences.

A critical issue during the feasibility stage is the political development in the host country. The host government would only approve the required mineral leases and mining authorizations, if its requirements for local content, tax rates, royalties, and profit sharing were met. The payments by the mining company to the state for the project need to be agreed upon prior to the detailed design phase. Conversely, the company would not continue with the next phase, if the political risk within the country were at an unacceptable level. In order to gain popular political support, the companies may give the state an equity stake in the project.

The NPV and IRR are recalculated, based on the refined data. Sensitivity analyses are undertaken to determine the behaviour of the NPV and IRR with changes in the commodity price, production rates, revenues, costs, inflation and interest rates.

On completion of the studies, all the information is integrated into a bankable document. It is normal for the bankable feasibility document to be audited by external technical and financial consultants to confirm the overall conclusions. Once the audit has been completed, the mining company would select a gearing ratio and approach lending institutions to secure finance. Banking institutions would employ in-house expertise to review and model project parameters to determine the risks associated with the project. In many instances the company would also invite other companies to invest in the project, in order to reduce its own risk exposure and balance its debt equity ratio.

3.4.3 Stage 3: Development

Once the decision has been taken to proceed with the project, backed either by finance or with good prospects of obtaining finance, the mining company would engage the services of external experts to undertake the detailed design of the project. The mine development stages are extensive and range from detailed technical design, environmental and social management, human resources, marketing, contracting, pre-production to construction and commissioning.

Technical design

Important aspects of the technical design phase are the mining method, based on the geology, the depth of the ore-body, equipment availability, water and electricity and rainfall figures, to ensure that the deposit could be mined effectively. The method and parameters selected have a direct impact on the cost of mining, the production rate and the ore recovery. The selection of the beneficiation process would be based on small scale beneficiation campaigns with in-situ material. Important issues include, but are not limited to, the milling method, the metallurgical recovery, the presence of oxidized material in the pit and relationships between tonnage, grade and recovery. A logistics

network has to be established to ensure the proper transportation of product, people and equipment. The mine's infrastructure is designed to suit the requirements of the project. To function properly, the mine typically would require the following infrastructure, dependent on the mine:

- ✓ In-pit crusher for opencast, hard rock mines
- ✓ Shafts, fans and underground infrastructure for underground mines
- ✓ Conveyor belts
- ✓ Beneficiation plant
- ✓ Electrical infrastructure, e.g. substations, powerlines, generators
- ✓ A water supply system
- ✓ Roads
- ✓ Workshops
- ✓ Rail or road loading facilities
- ✓ A railway line connecting onto the public railway line
- ✓ A tailings dam
- ✓ Administrative offices
- ✓ A sewage system
- ✓ Communication facilities
- ✓ A mining village, including schools, a clinic and recreational facilities
- ✓ Security

Environmental and social management

Detailed studies on the social and environmental impact of the project have to be undertaken and completed during the detailed design phase to ensure that the project would meet the requirements of the host government, the local community and the international investment community. Mining companies have to submit an environmental management report for approval before commencing with mining. Communication forums are held on a regular basis to inform the local population of project developments.

Human resource management

Human resource personnel establish the human resource matrix, job descriptions, salary specifications and training needs. The management and personnel associated with the operation often determine the success of the operation. Research would be done into the availability of local skills. It should be ensured that the majority of the employees were local and that expatriates are only employed in key managerial and technical positions, where these skills are lacking.

Marketing

Company marketing experts continuously observe the commodity market in order to detect fluctuations in the supply and demand of their product. Long-term price volatility, cyclical behaviour and future price projections are generated for the project's commodity. Contacts with commodity traders are established and a substantial portion of the production may be sold in terms of medium- to long-term contracts or hedged, in order to subject the project to a certain degree of stability. It is important for the project to enter the market at the upswing of the commodity price cycle in order to maximize revenue through increasing commodity prices.

Contracting

Various contracts have to be concluded between the mining company and the associated partners. In a contract with the host government, royalties, import regulations and tax rates should be defined. Equipment suppliers, consultants and construction companies are invited to tender for the construction of the mine. Because contractors can often provide services at cheaper rates than the mining companies, they enter into legal agreements for the mining of the minerals, the transport of the product, engineering, process-related work and mine security. Ideally, all non-core business is outsourced.

Pre-production activities

Prior to commissioning, pre-production activities are initiated. These activities include the recruitment and training of operational staff, the compilation of operational manuals, the establishment of a bonus system and safety procedures, the implementation of information technology and the planning of the commissioning process.

Construction

The erection of the project infrastructure would commence once the project site has been cleared. This could entail the relocation and resettlement of affected villages and costly compensation. The construction of the mining infrastructure, surface infrastructure, tailings dam, beneficiation plants, roads, workshops, water supply system, electrical and communication infrastructure have to be completed.

Commissioning

After the mine, the processing plant and the supporting infrastructure have been constructed, the commissioning phase commences. This could take up to six months, during which period production is progressively increased to 100% capacity. Financial institutions would undertake a completion test in which they observe the commissioning process to ensure that the mining company adheres to the design specifications.

3.4.4 Stage 4: Production

Once the mine has been commissioned, the mine enters a normal production routine according to the production plan. The mining company will try to maximize the return on investment through the effective management of the production process, people and equipment as well as by applying a philosophy of continuous improvement. The typical operational process is as follows:

- The ore is mined and treated by beneficiation processes.
- Waste products are deposited into a slimes dam, waste dump or backfilled into the mining void.
- The final product is transported via rail, road, sea or air to the final destination, usually a port in a first world country where the buyers of the product are located. Alternatively it can be transported to another site where further beneficiation takes place.
- Maintenance repairs are done on site, while major overhauls may require the importing of new equipment.
- Rehabilitation is undertaken concurrently with mining operation because the mining company usually has an obligation to return the mined out areas to an acceptably rehabilitated condition.

Royalties are normally payable to the host government. Royalties could take a number of forms and be payable to a number of persons and thus create substantial liabilities. Tax might only be payable once the operation has achieved certain financial benchmarks or after an agreed time-period. In addition to royalties and taxes, the mining company has to pay back loans to the lending institutions.

3.4.5 Stage 5: Closure

The mine closure phase commences once the reserves are depleted. Normally this would involve a scaling-down of operations and a phased retrenchment of the mine's employees in accordance with the EMPR. Once the mine has been completely rehabilitated, a closure certificate is obtained.

3.5 Playing the Game

3.5.1 Background - The Four Pillars of Playing the Game

Mining companies active in mineral developments, the operating of mines or the takeover of existing operations must be guided by a strategic plan, financial and legal management, operations management and business risk management for their particular mining investment. If not, they run the risk of reducing the profitability of their investment and potential losses can be large. The successful execution of the game plan is thus based on four pillars:

- ✓ **Strategy development pillar:** The formulation of a strategic plan, which enables the company with its mining operations and mining projects to compete successfully in the global market.
- ✓ **Legal and financial pillar:** This entails structuring the company and deals, capital raising and financial management.
- ✓ **Operations management pillar**: The establishment of an effective operations management system that enables full control of the mining operations at all levels and identifies improvement opportunities, in order to ensure that the mine operates in the lowest cost quarter and that the mining project is viable.
- ✓ **Risk management pillar**: A business risk management plan, that identifies, quantifies and simulates operational and project risks in order to establish a sound risk management plan. The risk management plan in itself requires strategies and an operations management system to be executed effectively.

Note: Please note that from this point onwards, junior mining companies are regularly referred to as JMC's in the thesis.

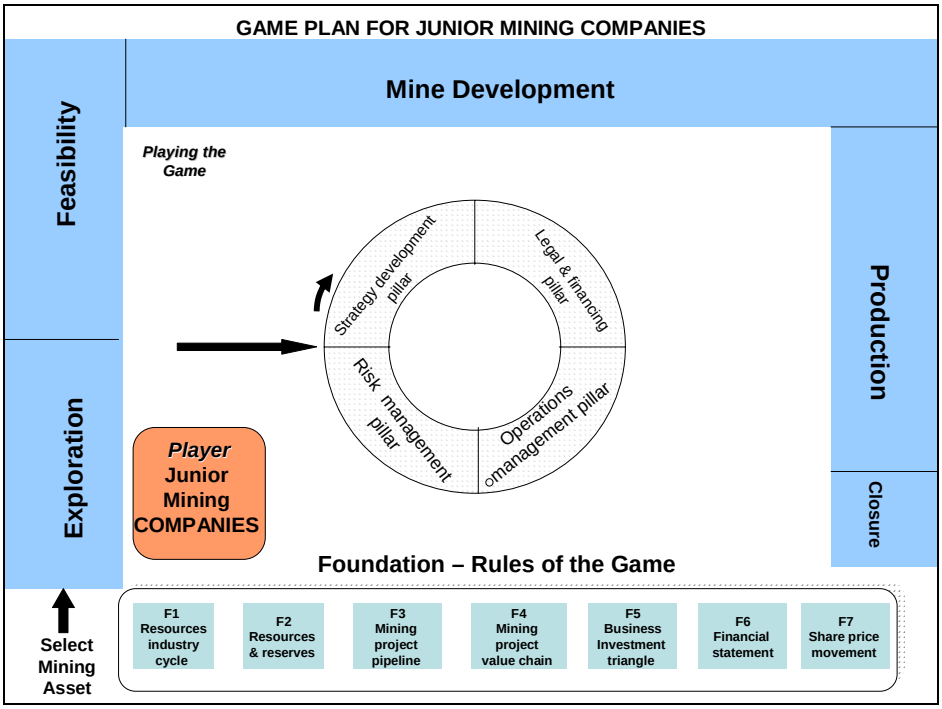


Figure 3.12 Playing the game - the four pillars

Each pillar in turn is defined by steps. Each step is made up of tasks. Each task comprises simple models and matrices that are applied to the specific junior mining company (JMC). The models are simple diagrams pertaining to the individual tasks that the author has developed over the period of research. Likewise matrices are simple spreadsheets that the author has developed for individual tasks.

The steps and tasks need to be linked and integrated in one iterative process to ensure that macro- as well as micro-aspects pertaining to the mining investment are accurately assessed and managed and that maximum benefit is accrued to all stakeholders of the investment.

The four pillars, representing the aspect of playing the game, are constrained and put in balance by the foundation, which make up the rules of the junior mining game.

Figure 3.13 indicates that the pillars are either strategic or tactical. The strategy development pillar is by implication strategic as it focuses on the strategic plan of the

junior miner. The legal and financial pillar, operations management pillar and risk management pillar are tactical, as they focus on the steps and processes of achieving the strategic objective.

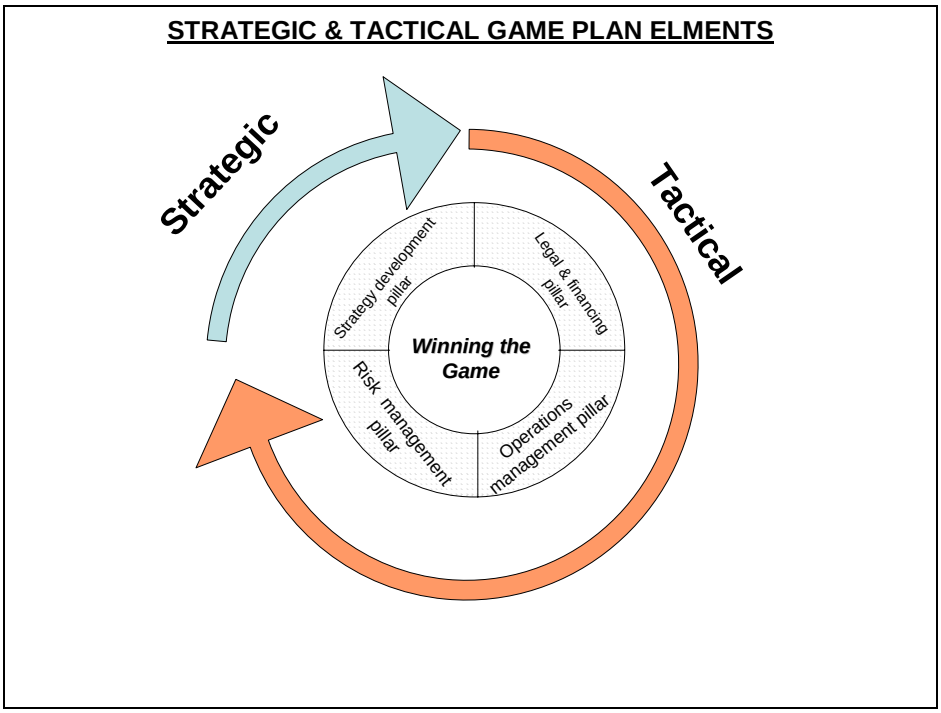


Figure 3.13 Strategic versus tactical game plan elements

3.5.2 Strategy Development Pillar

Lynch[41] defines strategy as an organization's sense of purpose and the development of plans and actions to put purpose into practice. Strategy is concerned with delivering long term added value to the organization. Key elements of a strategy are that it needs to:

- Be sustainable and can be maintained over time;
- Be distinctive, different from competitors and offer a competitive advantage which will allow an organization to grow;
- Exploit linkages between the organization and its customers, suppliers, competitors and government;
- Embrace a vision which will move the company forward in a significant way beyond current the environment.

Every strategic decision involves three aspects: firstly, the context, which is the environment within which the strategy operates and is developed (for the purpose of this thesis it is the junior mining sector); secondly, the content, which is the main actions of the proposed strategy; and thirdly, process, which involves the process of actions interacting with each other as the strategy unfolds in a changing environment.

Strategy is highly significant for companies as it covers all the areas and functions of the business, it is concerned with the survival of the business as a minimum objective and the creation of value added as a maximum objective, it directs the corporation within the changing environment, it is central to the development of distinctiveness of the company and it is critical to adding value to the supplies that are brought into the organization.

Lynch's elements were integrated in the strategy development pillar (Figure 3.14). Step 1 entails the business environment review, which examines the industry sector of the junior mining company, and the company SWOT, which is a review of the company's mining assets, team, financial resources, strengths and weaknesses. Step 2 entails the development of the strategy, which commences with the examination of the company's

mission and vision, developing strategic options and selecting the strategy from many options, building on strengths and overcoming weaknesses. Step 3 is focused on the implementation plans for the selected option.

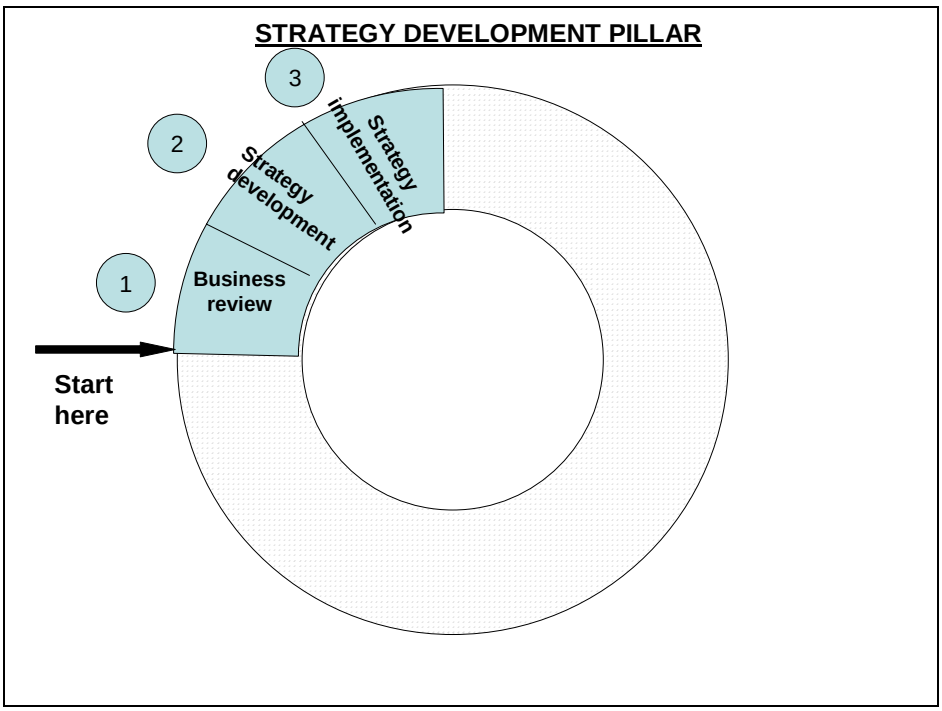


Figure 3.14 Three steps involved in the strategy development pillar

The steps and tasks are discussed below:

Step 1: Business Review

The business environment analysis entails a review of the industry of the junior mining company (JMC), as well as the internal review of the company, the company SWOT.

Table 3.2 Business review

Task	Area of investigation	Description
1.1	Industry overview	Overview of the applicable resource industry in a global, regional and local context.
1.2	Players and competitors	Understanding and description of major and junior miners in the game that compete with the company: company description, corporate structure, vision and strategy, mining assets, the team, financial performance.
1.3	Projects and operations	Types of operations applicable to the commodity determined and classified into exploration projects, feasibility studies, mine development projects and mines. Description of geology, exploration activities, resources and reserves, mining, processing, production, infrastructure, logistics and suppliers, marketing, human resources, SHEQ and financial data.
1.4	Host country analysis	Analysis of the host countries of the JMC and the associated country-related implications.
1.5	Technological innovations	A review of technological trends pertaining to the commodity market and implications for the JMC.
1.6	Key success factors	Determine key success factors for the JMC pertaining to corporate structure, resources, financing, mining, processing, engineering, infrastructure, suppliers, market, SHEQ, human resources and legal structures.
1.7	Opportunities	Listing of local and international opportunities for the applicable resources sector.
1.8	PEST analysis	An analysis of political, economic, socio cultural and technical environments.
1.9	Porters 5 Forces	An analysis of the five forces interacting on the resources sector: suppliers, potential entrants, buyers, substitutes and industry competitors. Where does the power lie and what are the implications for the JMC?
1.10	Company SWOT	Determine strengths and weaknesses, opportunities and threats for the JMC.

Step 2: Strategy development

This step entails the definition of a vision, mission and objectives for the JMC, the development of strategic options and the selection of a strategic option.

Table 3.3 Strategy development

Task	Area of investigation	Description
2.1	Vision, mission and objectives	Vision, mission and objectives of JMC defined, based on market opportunities.
2.2	Strategic options	Strategic options for the JMC developed, in alignment with industry analysis and company SWOT. Strategies defined for expansion, diversification, cost reduction, differentiation, focus and new market opportunities.
2.3	Strategy selection	Strategic options ranked and selected for the JMC, based on consistency with mission, building on strengths, overcoming weakness, technical and financial feasibility, skills availability, acceptable risk and attractiveness to stakeholders.

Step 3: Strategy implementation

This step entails the development of a strategic framework, strategic staircase, strategy implementation plan and milestone chart.

Table 3.4 Strategy implementation

Task	Area of investigation	Description
3.1	Strategic framework	Development of the strategic framework which outlines the interaction of strategy, structure, systems, style, staff and skills.
3.2	Strategic staircase - 7 year plan	Development of a strategic staircase which provides an overview for the major strategic steps in relation to a time line and provides a reference to capacities required.
3.3	Strategy implementation plan	Presentation of an implementation plan that translates corporate objectives into tasks and action plans with reference to operations, business development, marketing, financial, legal, research and development and human resources.
3.4	Milestone chart	Development of a high-level milestone chart that highlights core activities and time lines for the team.

3.5.3 Legal and Financial Pillar

This pillar is extremely important in the game. Right of tenure and sound contracts with various third parties, such as banks, consultants, equipment suppliers and BEE entities are of paramount importance for the success of a junior mining company. Contracting becomes a frequent activity that the player needs to engage in. It is beyond the scope of this thesis to discuss the details of legal contracting; this needs to be left to the appointed lawyers. However, the mining entrepreneur and investor need to understand the fundamentals of deals and legal structures when engaging in the game. Once these are understood, lawyers develop the detail around them, in often complex documents.

Financing is fundamental to the game. If the junior miner cannot acquire risk capital, it cannot develop its projects. During the initial life stages of the junior mining company, financing is mainly a function of equity finance, that is, seed funding, which is risk capital provided in exchange for equity. As the company progresses, debt financing becomes a proposition, as well as project finance. Throughout the project development phase, the junior mining company would try to complete the financing of the project. On the basis of the selected gearing ratio, the company would seek finance from financial institutions as well as from private equity. Investors and banking institutions would employ in-house expertise to review and model project parameters to determine the risks associated with the project. It is beyond the scope of this thesis to go into depth about financing details. What is required is that the player understands the concept of debt and equity financing. Prior to any financing, the player needs to determine the value of his asset and select a financing structure.

Diligent financial management is a key process for the junior mining company. The author’s experience has shown that there are three critical aspects to financial management of a company. These are strict control of expenditure against a set budget, a cash flow management and supplier age analysis system, in addition to monthly management accounts.

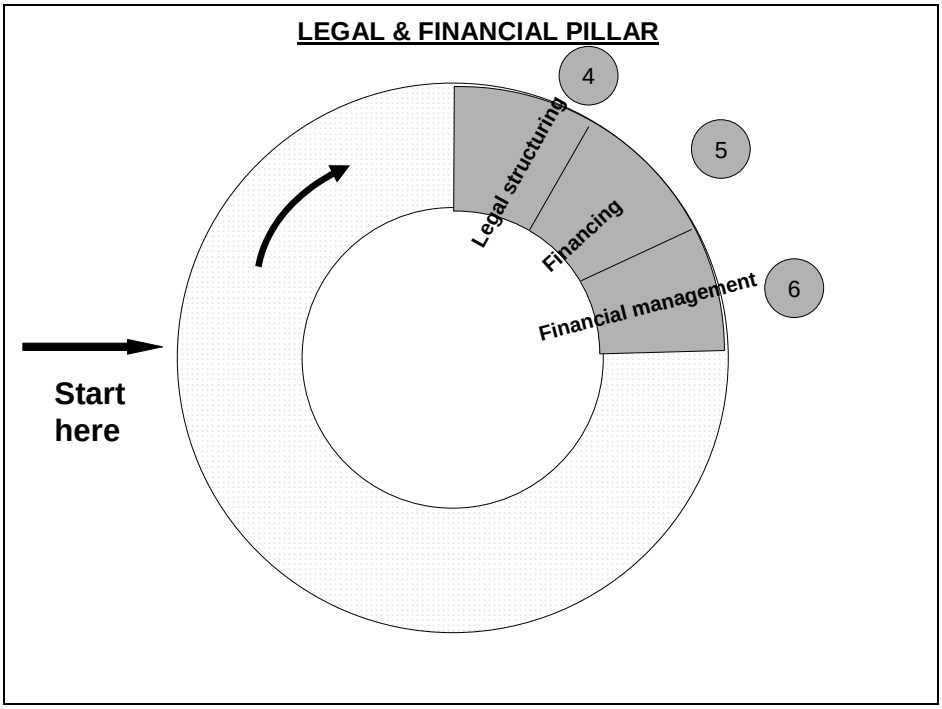


Figure 3.15 Three steps involved in the legal and financial pillar

Step 4: Legal Structuring

The legal step entails a summary of the holding structure of the company, as well as a legal structure of the project, termed the Project Special Purpose Vehicle (SPV). From experience, the author confirms that legal structuring and deals are a key component for the success of the business. Legal documents can be the seed of a successful or failing junior mining company.

Table 3.5 Legal structuring

Task	Area of investigation	Description
4.1	Holding structure	Development of optimal holding and operational structures for the JMC, which will facilitate funding, participation of investors as various levels, BEE and shareholder value.
4.2	Project special purpose vehicle (SPV)	SPV for JMC's project set up in a manner that is clear and facilitates value. To outline project relationship to project sponsors, financiers, advisors, suppliers, equipment providers, contractors, the market, insurers and the host government.

Step 5: Financing

The financing step commences with the valuation of the company, determining the financing structure and deals with equity and debt financing.

Table 3.6 Financing

Task	Area of investigation	Description
5.1	Valuation	Company valuation process undertaken. The foundation is the project NPV and comparable market transactions. Undertake 2 - 3 company valuations and average to determine company value. To be included are exploration costs, cash, equity, debt, surface stockpiles and overheads.
5.2	Financing structure	Company's financing clearly structured to cater for various project stages and facilitate ease of financing.
5.3	Financing - equity	Equity financing activities in place to secure risk capital for the JMC. Equity financing processes relating to the JMC listing on a stock exchange defined: competent person's report, financial audit, legal audit, prospectus, and marketing material. Company ready to pursue listing route.
5.4	Financing- debt	Debt financing processes in place with repayment, interest, and general terms that facilitate company growth. Debt financing process understood.

Step 6: Financial management

Once finance has been raised, the focus is on sound financial management to facilitate the execution of the strategic plan. Required are a budget, cash flow management system, a supplier age analysis system and monthly management accounts.

Table 3.7 Financial management

Task	Area of investigation	Description
6.1	Budget	Accurate, ambitious operational budget with realistic targets.
6.2	Cashflow management system	Analysis of cash flows (inflow and outflow), to allow for proper management of cash in the business.

6.3	Supplier age analysis	Analysis of JMC creditors for 120, 90, 60 and 30 days to provide overview of cashflow outflows.

3.5.4 Operations Management Pillar

Slack *et al* [42] describe operations management as a function that deals with "real" issues. It is about the arrangement of resources which is devoted to the production of goods and services. Operations managers are the staff of the organization that have the responsibility for managing the operations function. Operations management is the term for the activities, decisions and responsibilities of operations managers.

The aim of a junior mining venture is the development of an operational mine. Once operational, the mining asset needs to be managed. JMCs are often not focused on operational mines and rather focus on the development of mines. The entrepreneurs in these company often do not have an understanding of operational aspects, and tend to shy away from operational challenges or leave operations management to major mining companies. The author believes that this is a serous omission and any game plan needs operations management as a pillar for success. The operations management pillar is about managing the mining asset optimally. It is part of the tactical component of the game plan, which ensures that the strategy selected is optimally executed. Operations management is based on the management of systems, processes and people [43].

All operations produce goods and / or services through a process of transformation [42], that is, they use their resources to change the state or condition to produce outputs. Any operation can be modelled as a network of micro-operations with internal suppliers and customers.

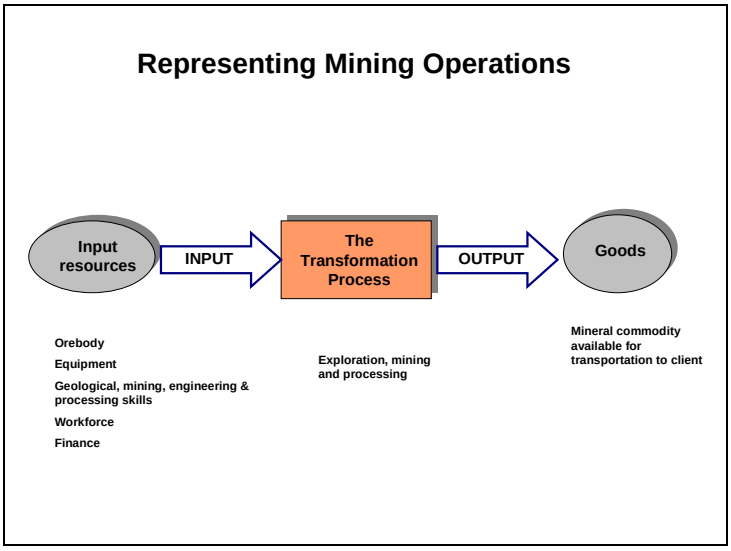


Figure 3.16 Representing operations

For the purpose of optimally managing the operation of the junior mining company, the author recommends that the operations management pillar entails three steps: Step 7: the development of an operations management system (systems), Step 8: operations optimization (processes), and Step 9: team management (people).

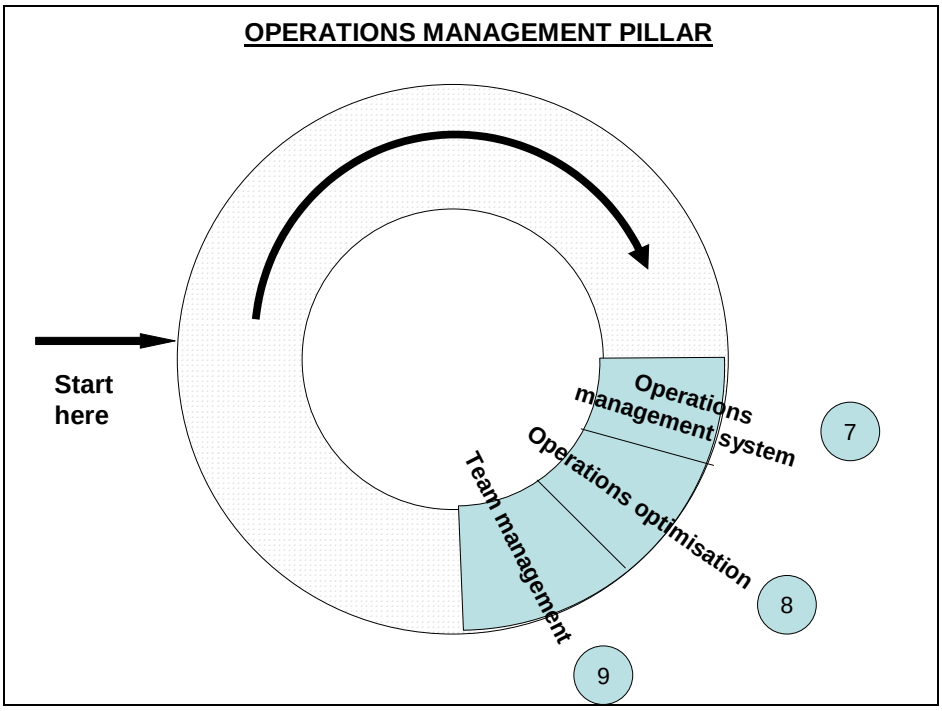


Figure 3.17 Three steps involved in the operations management pillar

This will ensure that systems, processes and people are addressed in the effort to extract maximum revenue and profit from the mining asset.

Step 7: Operations management system

Performance measurement is a prerequisite for any company. For this purpose, any mining company needs a management system. The operations management system is the self-sustaining tool for the JMC management, which organises and links facts together in a logical manner. It is the key communication tool for daily results and allows the team to make intelligent business decisions, as management constantly knows the status of conformity to production, equipment, manpower, quality and cost. It allows management to identify variances to the plan, take corrective action, make timely decisions and evaluate the effectiveness of their management intervention.

To begin with, the KPIs (Key Performance Indicator) of the JMC's operations need to be defined. Forecasts and plans have to be developed, from where a production, equipment and manpower schedule emerges. The schedule is used for the development of a shift report for execution, which is focused on the physical mining activities. The shift reports are summarised into daily, weekly and annual reports, which provide a feedback to the forecast.

Table 3.8 Operations management system

Task	Area of investigation	Description
7.1	KPIs	Have the operational KPIs for safety, mining, engineering, processing, transportation, quality, manpower been identified?
7.2	Operations Management System layout	Description of the operations management system layout in terms of forecasting, planning and scheduling, executing and reporting
7.2	Forecasting	Development of 10 year and annual mine plans for the mining operation.

7.3	Planning and Scheduling	Development of a monthly mine plan from which manpower and fleet are scheduled to meet the monthly mine plan.
7.4	Executing	Accurate reporting on key indicators at operational level to allow for action plans on a daily basis. Action plans are in place and discussed in daily review meetings.
7.5	Reporting	Analytical information of JMC to allow proper monitoring of the operational performance. Plan versus actual and root causes for deviation presented.

Step 8: Operations optimization

Operations optimisation entails the optimisation of business processes to bring about dramatic improvements in performance. It takes as an object the business processes.
Mines need to be continuously optimized in order to maximize the profits of extracting, processing and selling the mineral. The ultimate gain of an optimized mining asset is an improved return on investment, resultant investor confidence, the ability to service debt,and the ability to grow the company.

Table 3.9 Operations optimisation

Task	Area of investigation	Description
8.1	Business processes	Mine business processes defined: inputs, main business processes, outputs and support services. A clear definition of the performance objectives.
8.2	Supply chain	First and second tier customers and suppliers understood and used for relationships and optimisation.
8.3	Cause & effect	Key operational challenge defined and a cause and effect analysis undertaken on manpower, machinery, materials, mining method and money.
8.4	Opportunity database	Determine opportunities based on business process, supply chain, cause and effect analysis. Logging of opportunities on opportunity log, ranking of opportunities, with next action plan and responsibilities.
8.5	Project control sheet	Development of project control sheet to reengineer top opportunities. Sheet to outline purpose of project, goals, benefit, project dependants, project schedule, cost and action plan.

Step 9: Team management

Kiyasaki [37] refers to business as being a team sport. The author agrees. Success comes from taking "tests" as a team, not as an individual. A team entails different types of people with different skills coming together to work together. The JMC needs to bring out the best in the team in order for the venture to maximize returns. The key tools to effective team management are the JMC organogram, job profiles, profiles for consultants, a profit sharing scheme, effective leadership and means to identify and manage different personalities.

Table 3.10 Team management

Task	Area of investigation	Description
9.1	Organogram	Organogram of JMC board of directors and team. Positions clearly displayed.
9.2	Job profiles	Job profiles established for JMC team and consultants. To be included are critical performance area, critical performance indicator, deliverable summary and description.
9.3	Employee profit share	Employee profit share scheme in place which determines profit share scheme for management and employees for motivational purposes.
9.4	Leadership	Regular communication from the CEO to communicate JMC events, results, actions and future prospects.
9.5	Personality management	Have the BOD analysed the personalities of the team members to play on their strengths and overcome their weaknesses?

3.5.5 Risk Management Pillar

Atkinson *et al* [44], in their article on risk management for mining projects, have outlined the increasing need for mining companies to focus on the risks of projects, such as:

- ✓ Mining is a high risk business with long lead times, which results in high capital exposure, before the investor sees a return.

- ✓ Most new large-scale mining projects are developed in hostile geographical areas, where little experience of mining operations has been gained.
- ✓ New mining projects have to compete with high-tech operations elsewhere.
- ✓ New mining projects are inherently risky and characterized by:
  - ✓ very large capital outlays
  - ✓ long lead times before positive cash-flows are generated
  - ✓ increasing use of advanced technology
  - ✓ stringent environmental and safety requirements
  - ✓ new tax laws
  - ✓ increasing involvement in political, fiscal and regional economic issues
  - ✓ complex contractual, insurance, ethic and legal issues

There is therefore a need for the early identification of risks and uncertainties before committing large sums to a capital-intensive mining project. It is assumed that the production process will generate a cash-flow for the operation. Variables, such as revenue, capital expenditure and operating expenditure have been carefully predicted. However, in reality, the returns of a project can never be certain, because they are subject to variables, such as recessions, political conflicts, fluctuating commodity prices and technological change. The risk association with an investment therefore is the function of estimated or perceived returns. The higher the risk, the higher the required return [(45)]

Smith [(46)] outlined the two aspects in the concept of risk: Uncertainty and consequence, which are expressed as follows:

Risk = Uncertainty (Probability) x Consequence (Impact)

Smith defined *Uncertainty* as the state of not knowing. Uncertainty can be reduced by obtaining more information and is then expressed as a probability. *Consequence* is defined as the impact or the measure of the effect of a variable on the project. Combining uncertainty and consequence gives a measure of risk.

The risk management pillar (Figure 3.18) entails risk identification, risk quantification (determining the probability and impact of the risk) and management of the risks.

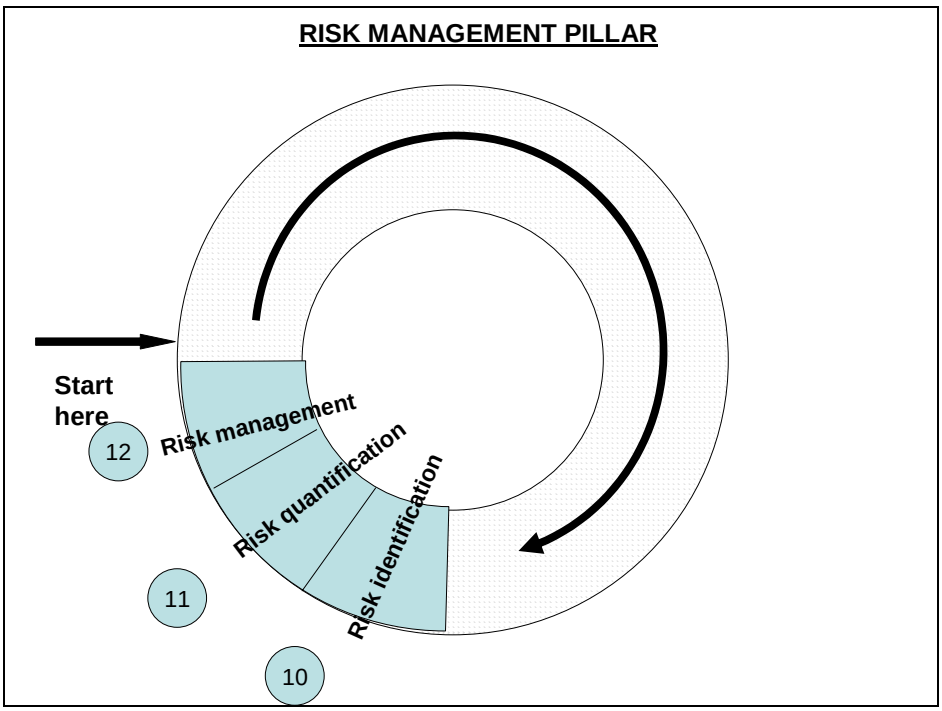


Figure 3.18 Three steps involved in the risk management pillar

Step 10: Risk identification

Risks need to be identified for the categories of corporate, operations, team, market and legal. There are five tasks to this step:

Table 3.11 Risk identification

Task	Area of investigation	Description
10.1	Corporate risks	Corporate risks identified relating to: strategic direction, acquisitions, JV partners and shareholders, corporate governance.
10.2	Mining asset risks	Mining asset risks identified pertaining to geology and exploration, mining, processing, infrastructure, the environment, weather, production performance, health and safety, industrial action, contractors, project completion, project assumptions and operating costs.

10.3	Team risks	Risks relating to skills & company leadership.
10.4	Market risks	Market risk relating to a falling commodity price, which is a function of demand and supply.
10.5	Legal risks	These risks relate to mining legislation, contracts and host country politics.

Step 11: Risk quantification

This step entails the two tasks of determining the economic value of the risk and simulating the risk. For this purpose the probability and financial impact of the risks need to be determined, should the risk materialize. The risks need to be incorporated and simulated on the economic models of the JMC in order to determine the negative impact on the IRR and NPV.

Table 3.12 Risk quantification

Task	Area of investigation	Description
11.1	Economic value of risk	Have the probability and impact of the corporate, operational, team, market, legal and financial risks been determined? Has a risk ranking been undertaken of high, medium and low risks?
11.2	Risk simulation	Have the risks effects been simulated on the economic model of the company?

Step 12: Risk management

The final step of the risk management pillar entails the tasks of developing a risk management plan for the high and medium risks, and ensuring corporate sustainability through corporate governance practices, community development initiatives and environmental management.

Table 3.13 Risk management

Task	Area of investigation	Description
12.1	Risk management plan	Has a risk management plan been defined for the JMC's high and medium risks?
12.2	Corporate sustainability	Is corporate sustainability ensured through corporate governance practices, community development initiatives and environmental management?

3.6 The Goal – Winning the Game

The player of the game, the junior mining company, has primarily commercial goals. These are becoming an attractive investment proposition for its shareholders and investors, capital growth for its shareholders, the successful growth of the company to a mid-tier player or the possible buyout of the junior mining company by a major mining company. In addition to these commercial goals, sustainability is a key objective.

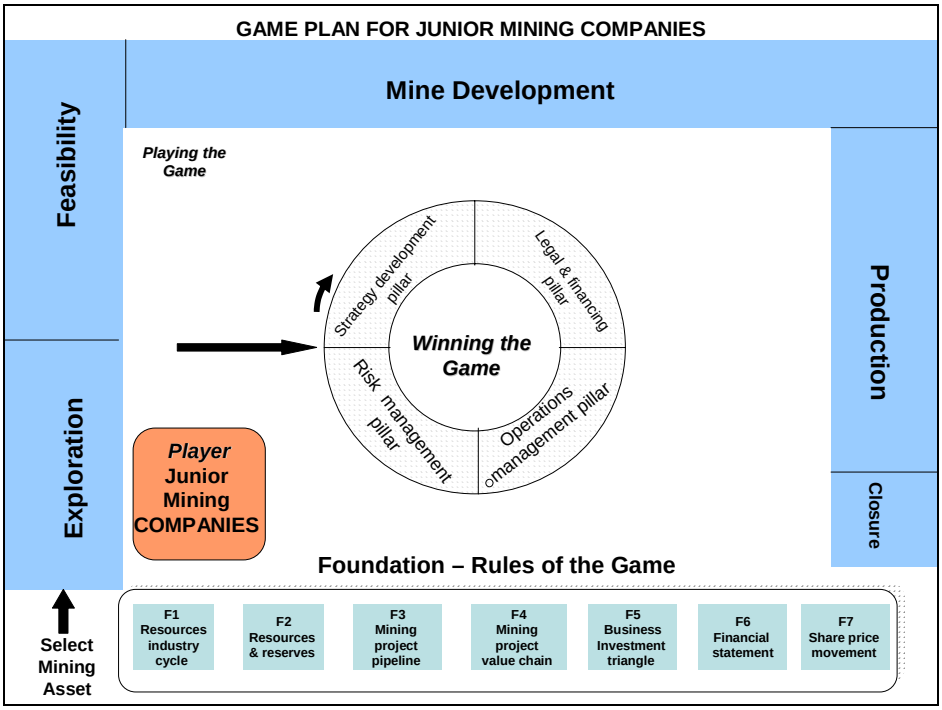


Figure 3.19 Winning the game

The goals are discussed below:

Attractive investment: IRR +++: The junior mining company wants to become an attractive investment proposition to investors. The main reason is that the junior is playing in a game that requires substantial capital to take the asset up the value curve to a point where it is a producing mine. In order to raise capital, the company needs to represent an attractive investment proposition to investors, who are willing to invest risk

capital. The foundations to this are primarily projects that have highly attractive IRRs, representing blue sky potential.

Successful growth to mid-tier mining company: The natural progression for a successful junior miner, should it not be acquired by a major miner, is the successful growth to a mid-tier mining company. Mid-tier companies are already significant in size, with multiple producing mines and large projects. These companies, however, still have a significant entrepreneurial approach as they have started out small by a group of entrepreneurs. Examples are Randgold Resources, First Quantum and Metorex.

Buyout of the junior by a major: Many junior mining companies have as a key objective the buyout of their company by a major mining company. Both parties score. The founders are rewarded financially, often handsomely, for their efforts of having started the company. The major miner buys the company mainly for the projects that have been taken up the value curve and therefore increases the resources base significantly.

Sustainable: In the 21st century, junior mining companies have to be sustainable. Sustainability is defined as being in alignment with globally accepted environmental, social, community development and corporate governance practices. Investors, whether these are banks, funds or individuals are highly sophisticated and informed and bad press immediately leads to a flight of investors and a corresponding drop in the market value of the company.

To win the game, the junior mining company needs to be globally competitive. It requires attractive resources and reserves, a wining strategy, suitable technology to extract the reserves, a market for the minerals, the necessary infrastructure, sound environmental and health and safety compliance, a committed team with skills, attractive capital and operating expenses, finance for execution, sound legal contracts and a pro-mining political dispensation in the host country. A winner of the game would have the share

price history of the mid-tier company First Quantum Mining [47]: significant, continuous growth over a 3 year period.

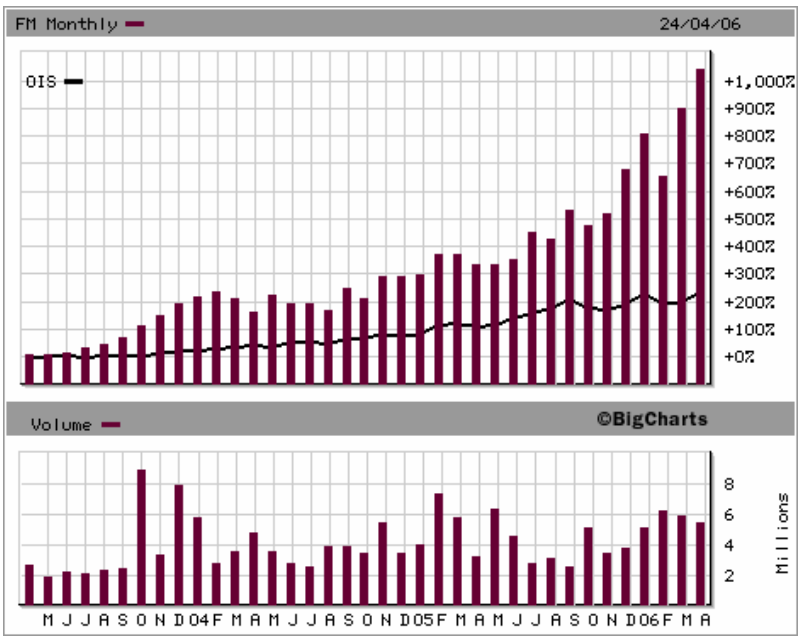


Figure 3.20 Share price movement of First Quantum

3.7 Game Plan Database

The player of the game of junior mining requires access to a database when playing the game. The database provides input and benchmarks for the strategy development, legal and financial, operations management and risk management pillars.

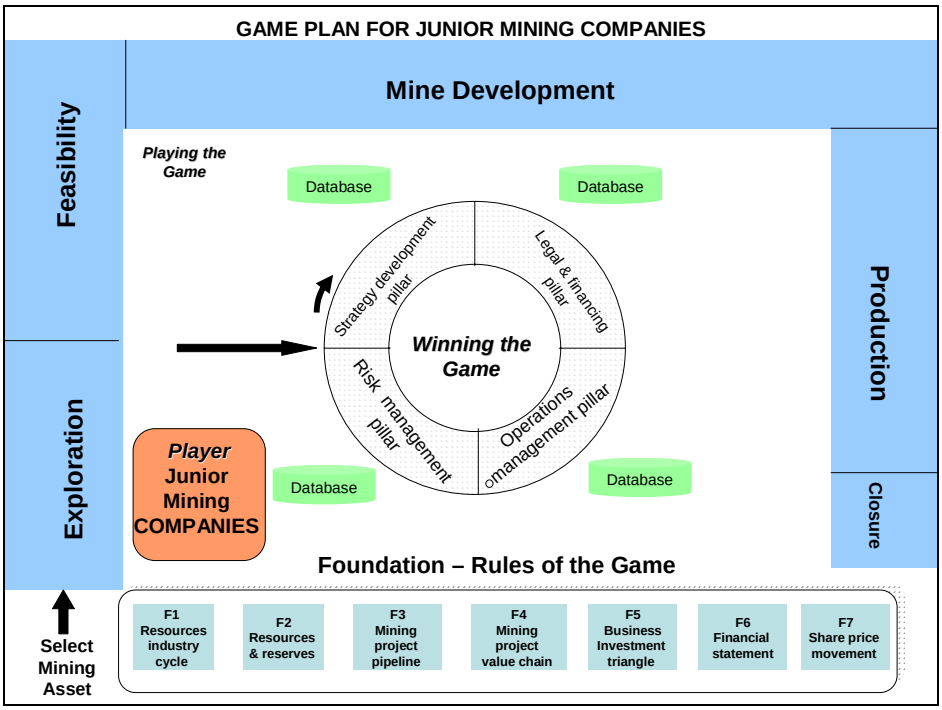


Figure 3.21 The game plan database

To establish the database, twenty pre-screened junior mining companies, from the Toronto, Australian, London and Johannesburg stock exchanges were selected, reviewed and classified into top, medium and poor market performers. The companies were analyzed in terms of corporate structures, strategy, operations, teams and financial performance and the results used as an input for the database.

The database for the operations management pillar also consists of key concepts from mine optimisation projects, projects which were aimed at maximising the performance of the mining asset. In addition, people leadership principles form part of he database.

The database for the risk management pillar are research results from the author's MSc Eng dissertation "Identification, quantification and simulation of risks facing greenfields mining projects in sub-Saharan Africa" [40].

3.8 Scoring the Game

Any game culminates in a score. As in the games of soccer and chess, there is an ultimate result, a score. The score provides a benchmark for the junior mining company and determines whether it is a winner or a loser, giving the team an opportunity to remain on course or alter the company's business pillars in order to ensure that it regains global competitiveness.

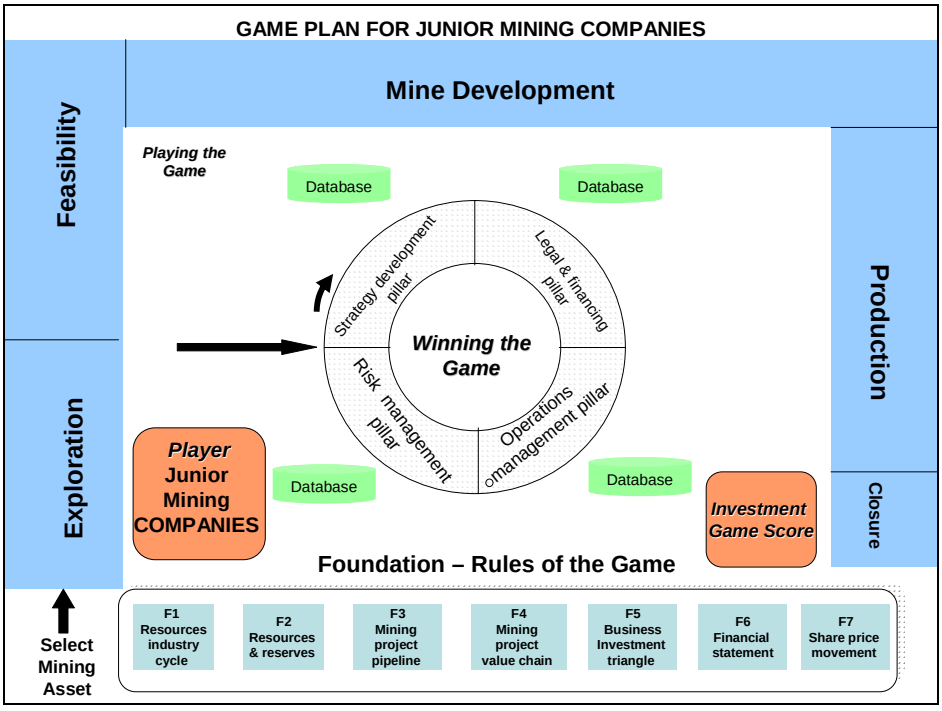


Figure 3.22 Scoring the game

The score is undertaken by completing the investment score matrix. This is done either by the investor or entrepreneur or the team in a facilitated workshop. Scorers are required to have experience in the development and running of junior mining companies. To ensure that the game score is a true reflection of the status quo of the junior mining

company and that inputs have not been manipulated, the scorer should be ideally independent, or alternatively, the workshop should be chaired by an independent party. For purpose of the assessment a score between 1 and 5 applies:

5: Excellent
4: Good
3: Fair
2: Poor
1: Not achieved

The following is scored in the junior mining company game plan:

The mining asset: This is an assessment of the asset of the junior mining company. The asset of the JMC, whether it is an exploration project, a feasibility study, a mine development project or the mine is assessed in terms of geology, resources and reserves, the host country, mining, processing, infrastructure, the market and the finance ability of the project. For each aspect of the asset, a score between 1 and 5 is given. The mining asset contributes 25% to the total score.

The business pillars: The business pillars, strategy development, legal structuring and finance, operations management and risk management are assessed to determine how the JMC is playing the game. Each step and activity is rated between 1 and 5 by the assessor, culminating in an average score per business pillar. Naturally, reasons need to be provided for each score. The business pillars are the most important aspect of the game plan and contribute 50% to the total score.

Financial performance: The financial performance score is made up of an assessment of the financial statement of the JMC and a comparison of key financial ratios of the JMC to that of leading JMC's in the database. If the JMC is listed on a stock exchange, an analysis of the share price movement over a three year period is included. The financial performance contributes 25% to the total score.

The author believes the business pillars should have the biggest weighting at 50%, as the JMC is dependant on optimally functioning business pillars in order secure attractive mining assets, which in turn will deliver superior financial performance. The business pillars are the foundation for success, whilst the mining asset and financial performance are equally important, but only at 25% respectively.

Total Junior Mining Company Score

The scores of the mining asset, business pillars and financial performance are combined into one score, as per the above ratios, to obtain a total junior mining company game score between 1 and 5. This score can be used as an index by the mining investor/entrepreneur, when comparing two or more companies. Also, areas of strength and weakness are highlighted, allowing weaknesses to be managed and strengths to be exploited. Undertaking this process will ultimately lead to a globally competitive mining company.

3.9 Summary

In this chapter the game plan for the junior mining company was developed. The game plan can be compared to the game of soccer with a foundation, rules, the player, assets and different processes. Each game is unique. The challenge of this chapter lay in presenting a game plan in a linear fashion.

The game plan has a foundation. The foundation for the junior mining game is the resources industry cycle, the mining project value chain, the mining project pipeline, the business investment triangle applied to junior mining and financial performance measurement.

The player of the game is the junior mining company, which is driven by mining entrepreneurs and investors, with a healthy appetite for the risks and rewards of the

industry. An adequate description of junior mining companies is the corporate structure, the company strategy, a review of mining assets, the team and financial performance.

The mining asset of the junior mining company can be an exploration project, a feasibility study, a mine development project or an operational mine.

The goal of the junior mining company is primarily commercial. These are to present an attractive investment opportunity to the market, through projects that have an attractive IRR. Another goal is the successful growth of the junior mining company to a mid-tier mining company. Alternatively, winning could also entail having the junior mining company being bought out by a major mining company. Key to winning is sustainability, which requires the junior mining company to be aligned with internationally accepted environmental, social, community development and corporate governance practices.

Four pillars define the process of playing the game. The strategy development pillar, the legal and financial pillar, the operations management pillar and the risk management pillar. Each pillar is defined by three steps. In total, there are twelve steps. The strategic pillar is by implication strategic, while the legal and financial pillar, the operations management pillar and the risk management pillar are tactical, as they focus on the processes and steps of achieving the strategic objective.

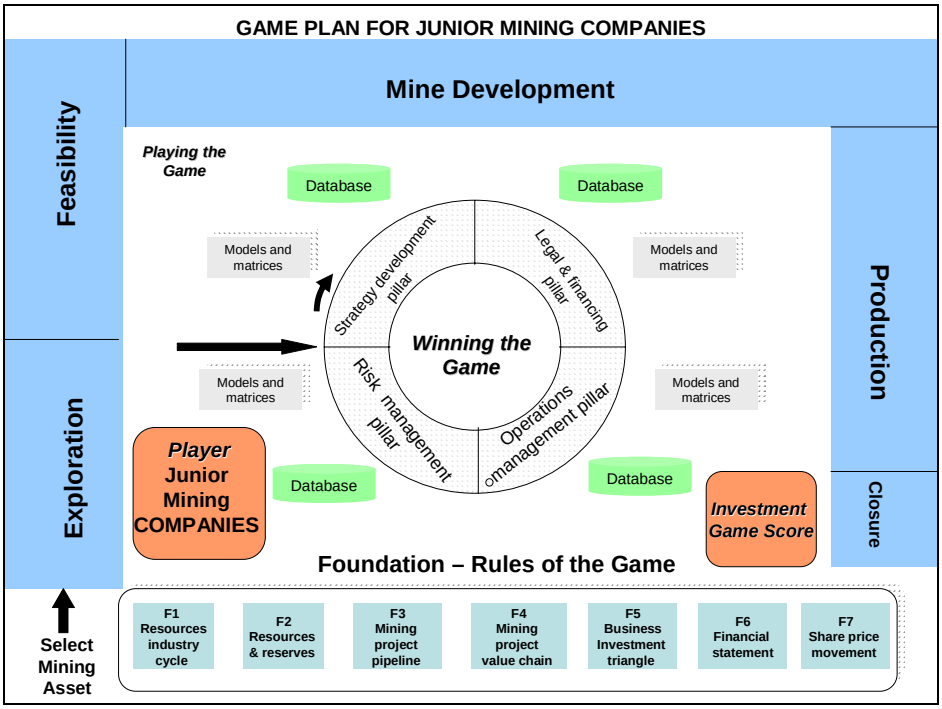


Figure 3.23 The complete game plan layout

Scoring the game is undertaken by the score matrix, which is completed by the player of the game. The following is scored to provide an overall rating of the junior mining company: the mining assets, the business pillars and the financial performance. The total score highlights the strengths and weaknesses of the company. Undertaking the process of playing the game iteratively will lead to creating a globally competitive junior mining company.

CHAPTER 4. DEVELOPMENT OF THE GAMEPLAN DATABASE

4.1 Introduction

The player of the junior mining game is required to play the game in a manner that will result in the junior mining company becoming a market winner. There is a need for benchmarking in this game, the key question being: *"How does my junior mining company fare against market players?"*. Also, the question arises: *"What can I learn from top performing junior mining companies and apply to my own company in order enhance my success rate?"*

The purpose of this chapter is to develop the databases for the game plan, which serve as benchmarks and are to be used as the player moves along the steps of the pillars. (Figure 4.1). This chapter represents a summary of the extensive research that has been undertaken for the thesis, as well as the practical experiences gained in setting up a junior mining company and in optimising mining assets.

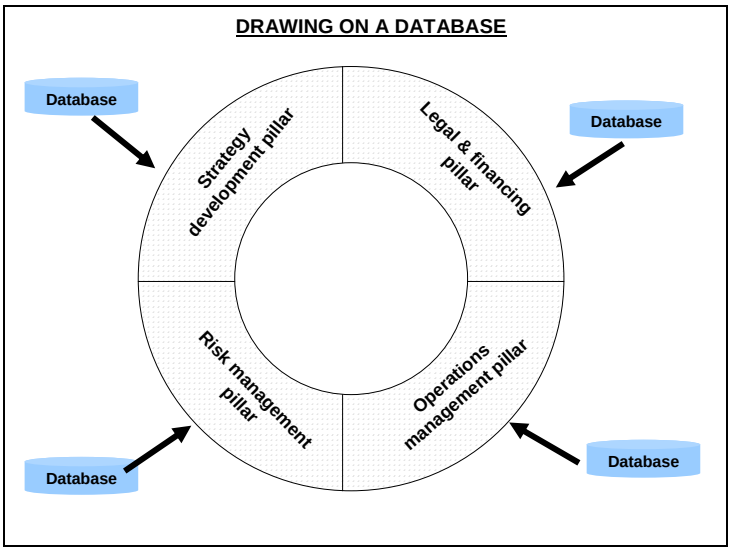


Figure 4.1 Drawing on the database

This Chapter is divided into two sections.

The first section provides a review of twenty randomly selected and listed junior mining companies from the Toronto, Australian, London and Johannesburg stock exchanges. The companies are classified into top, medium and poor performers and have been analyzed in terms of corporate structures, strategy, operations, teams and financial performance. The purpose is to create databases which serve as benchmarks mainly for the strategy development and legal and financing pillars of the game plan. Particular emphasis is placed on creating data from the top market performers, as these are companies that have a winning formula that the player must consider emulating. Please note that this particular section is a reflection of the junior mining companies operating in the period 2003 – 2006. It requires regular updating, for correct benchmarking, as the players of the game, as well as the market, continuously change.

The second section deals with the development of databases relevant to the operations management and risk management pillars, the tactical components of the game plan. The key practical principles of mine optimisation (maximising the profitability of mining assets), team leadership, as well as identifying risks for mining ventures are incorporated into separate databases, ready for use. In this section, the author draws extensively on his practical experiences in mine optimisation projects on various mines across the globe, as well as his MSc Eng dissertation [(40)] .

The databases developed are diverse and may appear unrelated, but they are integral to the successful development of a game plan.

4.2 Research: Review of Twenty Listed Junior Mining Companies

4.2.1 Background

To gain an understanding of the junior mining game, the author undertook a detailed analysis of the junior mining players in the game. These were companies listed on the Australian, Toronto, London and Johannesburg stock exchanges, the main international mining bourses. From each stock exchange, five companies were selected, whose main focus were exploration and mining projects on the African continent. As there were hundreds of junior mining companies to select from, the author pre-screened companies which presented themselves at the Cape Town Mining Indaba of 2005 and included only those in his list that would give a fair representation of the junior mining sector. Information on these companies was obtained through their Annual Reports, presentations to investors on their websites and mining journals during the period 2003 to 2006. The purpose of this analysis was to understand the game plan of these players, and particular focus was given to those of the winning players in order to establish benchmarks and references for junior mining companies playing the game.

The first step entails an introduction of the twenty selected junior miners. Next, these companies are classified into top, medium and poor performers, based on a review of the share price performance against the Dow Jones Mining and Exploration Index over a three year period. Following this, the databases are developed for the game plan. The following companies were analyzed:

Table 4.1 Junior mining companies analyzed

Australian Stock Exchange (ASX)	**Toronto Stock Exchange (TSX)**	**London Stock Exchange (LSE)**	**Johannesburg Stock Exchange (JSE)**
Anvil Mining	Tiomin Resources	Petra Diamonds	Thabex Exploration
Equinox Minerals	Adastra Minerals	Jubilee Platinum	Metorex
Gallery Gold	Banro Corporation	African Eagle	SXR /Aflease
Aquarius Platinum	Etruscan	Kenmare Resources	DRDGold
Resolute Mining	First Quantum	Randgold Resources	Barplats

The twenty junior mining companies were analyzed in terms of the following:

- Corporate profile: A brief overview of the company, corporate structure, shareholders, listing details , share price and market capitalisation.
- Company strategy: Vision, mission and corporate strategy of the junior mining company.
- Mining assets: An in-depth analysis of mining operations, mine development projects, feasibility studies and exploration projects.
- Team analysis: A review of the board of directors and management team in terms of experience and qualification.
- Corporate sustainability: Corporate governance practices, community development and environmental management.
- Financial analysis: An assessment of the financial statement of the company, equity financing activities, debt financing activities and the share price performance.

Details of this analysis are provided in Appendices A, B, C and D. Please note that an attempt has been made to present the data as accurately as possible. The author, however, does not take any responsibility for the correctness or accuracy of the data or any errors or omissions. The focus here is on concepts and trends and extracting these for the purpose of the game plan development, rather than on accurate project data.

4.2.2 Summary Description of Junior Mining Companies

i) The Australians

Table 4.2 Anvil Mining (47,48, Appendix A1)

Company description	➢ Anvil is a mineral producing, development and exploration company with a focus on copper and silver mining in the DRC. ➢ The company is one of the first juniors to establish itself successfully in DRC, thus has 'first mover' advantage. ➢ The company's philosophy is to keep initial capital investment to a minimum with upgrades to be financed from internally generated cashflow.	**Share price vs. Index** 
Mining assets		**Resources and reserves**
Mines	➢ Dikulushi Mine: openpit mine commercial production in October 2002	1.7 Mt , 7.2% Cu
Mine development	➢ No projects	**Financial**
Feasibilities	➢ Mutoshi JV: Rehabilitation of old mines with high grade copper and cobalt resource	➢ Market Cap: $15 mill
Exploration	➢ Exploration projects within a 30km radius of the Dikulushi Mine	

Table 4.3 Equinox (47,49, Appendix A2)

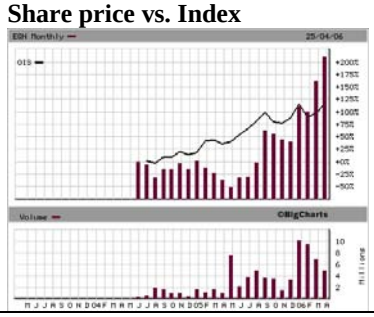
Company description	➢ Equinox aims to become a mid-tier copper producer, through the development of the Lumwana copper project, which is located in Zambia and has the potential to become the largest copper mine in Africa. ➢ The company has exploration projects in Zambia, Australia, Peru and Sweden.	**Share price vs. Index** 
Mining assets		**Resources and reserves**
Mines	➢ No mining operations	➢ Resource: 631 Mt, 0.6% Cu ➢ Reserve: 205 Mt, 0.8 % Cu
Mine development	➢ No projects	**Financial**
Feasibilities	➢ Lumwana copper project. ➢ Opencast mining, 17 years life of mine	➢ Market Cap: $51 mill
Exploration	➢ Exploration projects in Zambia, Australia, Peru and Sweden	

Table 4.4 Gallery Gold (47,50, Appendix A3)

Company description	➢ Gallery Gold is an Australian company, whose principal activity consists of the development of the Mupane Gold project in Botswana and exploration of properties in Tanzania and Botswana. ➢ The company has taken Mupane from discovery in 1998 to a producing mine in 2004.	**Share price vs. Index** 
Mining assets		**Resources and reserves**
Mines	➢ Mupane Gold Mine: opencast mining using conventional processing methods	Resources: 1.3 Moz Reserve: 0.6 Moz
Mine development	➢ No projects	**Financial**
Feasibilities	➢ Buckreef Prefeasibility Study: potential underground and openpit mine in Tanzania.	Market Cap – no information
Exploration	➢ Focus in extension of Mupane life, exploration projects in Lake Victoria district.	

Table 4.5 Resolute Mining (47,51, Appendix A4)

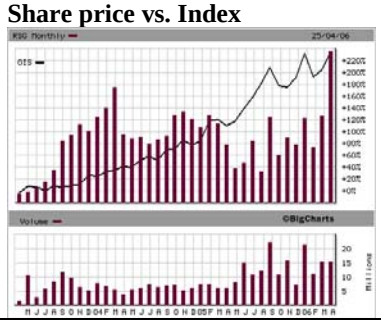
Company description	➢ Resolute is a developer and operator of quality gold mining projects in Africa and Australia. ➢ Its core activities have been the development of operating mines in Tanzania and Mali.	**Share price vs. Index** 
Mining assets		**Resources and reserves**
Mines	➢ Golden Pride: opencast mine in Tanzania:2.5 mill tpa	Golden Pride ➢ Resources: 0.7 Moz ➢ Reserves: 0.6 Moz Syama: ➢ Resources: 4.5 Moz ➢ Reserves: 1.6 Moz
Mine development	➢ No projects	**Financial**
Feasibilities	➢ Syama, mothballed mine acquired from Randgold Resources. 15 month schedule to bring online	Market Cap: $147 mill
Exploration	➢ Various exploration projects in Tanzania	

Table 4.6 Aquarius [47,52, Appendix A5]

Company description	➢ An Australian PGM miner with platinum and chrome projects in South Africa and Zimbabwe. ➢ Entered into the platinum business with the creation of the Kroondal Mine ➢ Focussed on cost-effective capital structure, outsourcing and reducing risk through off-take agreements with major platinum producers.	**Share price vs. Index** 
Mining assets		**Resources and reserves**
Mines	➢ Kroondal Platinum Mine: opencast and underground, 50% ownership, 4.2 mill tpa ROM ➢ Marikana Platinum Mine: opencast mine, 1.5 mill tpa ROM ➢ Mimosa Platinum Mine: underground mine, 50% ownership, 1.4 mill tpa ROM ➢ Chromite Tailings Retreatment of Kroondal tailings	Total ➢ Resources: 19 Moz ➢ Reserves: 9 Moz
Mine development	➢ Everest Mine: opencast and underground project in SA, eastern limb, with BEE partner	**Financial**
Feasibilities	➢ No feasibility studies	➢ Market Cap: $689 mill
Exploration	➢ Various exploration projects in close proximity to existing operations	

ii) The Canadians

Table 4.7 Tiomin Resources (47,53, Appendix B1)

Company description	➢ Tiomin Resources is focused on the development of the Kwale titanium mineral sands deposit in the coastal province of Kenya. ➢ The company is intent on becoming one of the lowest cost titanium producers in the world and Kenya's first major mining operation.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ No mining operation	➢ 254 Mt, 3.5 % THM, 8.9 Mt heavy mineral concentrate
Mine development	➢ No mine development project	**Financial**
Feasibilities	➢ Kwale heavy minerals project. Openpit mining and mineral separation project. ➢ Initiated in 1995 with exploration. 11 years life of mine.	➢ Market Cap: $34 mill
Exploration	➢ Exploration projects in Kenya, near Kwale and Peru.	

Table 4.8 Adastra (47,54, Appendix B2)

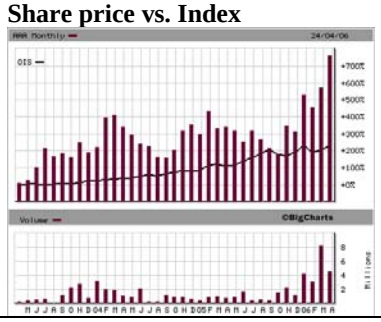
Company description	➢ Established in 1995 as an exploration company. ➢ The main mission of the company is the commercialization of the world's most significant copper and cobalt resource, the Kolwezi tailings, as well as the redundant Kipushi mine in the DRC.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ No mining operation	➢ Kolwezi: 112 Mt, 1.5% Cu, 0.2% Co ➢ Kipushi: 16 Mt, 17% Zn, 2% Cu
Mine development	➢ No mine development project	**Financial**
Feasibilities	➢ Kolwezi tailings cobalt copper project. Recovery of tailings produced by mineral concentrator. ➢ Kipushi: Underground mining project in DRC in partnership with Kumba Resources.	➢ Market Cap: $127 mill
Exploration	➢ Exploration projects in Angola	

Table 4.9 Banro (47,55, Appendix B3)

Company description	➢ Banro is a gold exploration company with four wholly-owned properties along a major gold belt of the DRC. ➢ The company believes the Twangizi-Namoya gold belt is the largest underdeveloped gold belt in Africa. ➢ An exploration program is underway to delineate and extend the resource base.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ No mining operation	➢ Resources: 8 Moz
Mine development	➢ No mine development project	**Financial**
Feasibilities	➢ No feasibility studies.	➢ Market Cap: $95 mill
Exploration	➢ Exploration properties in the DRC, comprising 2600 km2. Extensive exploration campaign.	

Table 4.10 Etruscan (47,56, Appendix B4)

Company description	➢ Etruscan is a diversified junior mining company, which is focussed on the exploration, development and production of gold properties in Niger, Burkina Faso, Cote d'Ivoire and Mali. ➢ In South Africa the company is focussed on the exploration and production of alluvial diamonds. ➢ The company's strategy is a transition from gold explorer to gold producer.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ Samira Hill Gold Mine (Niger). Open pit mine, Q1 production 22,00 oz. ➢ Trisano Diamond Mine (South Africa). Alluvial diamond mine, mined in partnership with Transhex.	Samira: ➢ Resources: 0.5 Moz ➢ Reserves: 0.6 Moz Youga: ➢ Resources: 8.7 Moz Trisano: 12 mill m3, 2.8t.100m3
Mine development	➢ Youga Gold project (Burkina Faso). Open pit mine, 5 year LOM.	**Financial**
Feasibilities	➢ Agbaou Gold Project (Cote d'Ivoire)	Market Cap: $113 mill
Exploration	➢ Exploration projects in Mali and Burkina Faso	

Table 4.11 First Quantum Minerals (FQM) (47,57, Appendix B5)

Company description	➢ Leading mid-tier copper producer, which is focussed on developing and operating copper mines in the Copperbelt in the DRC and Zambia ➢ Goal is to leverage off 10 year experience on copperbelt. ➢ Company produces copper cathode, copper concentrate and sulphuric acid.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ Bwana Mkubwa: / Lonshi. Unique operation with Lonshi open pit mine in the DRC and SX/EW processing plant in Zambia. ➢ Mopani: copper mines. 10% ownership of Nkana and Mufulira operations in Zambia	Bwana Mkubwa: ➢ Resources: 3 Mt, 5.5% AsCu ➢ Reserve: 3 Mt, 5.6% AsCu Kansanshi ➢ Resources: 302 Mt, 1% Cu ➢ Reserve: 142 Mt, 1.4% Cu
Mine development	➢ Kansanshi: open pit mining project (Zambia)	**Financial**
Feasibilities	➢ Frontier Copper Prefeasibility Project (DRC) ➢ Guelb Moghrein Cu Au Project: Openpit gold Cu project	Market Cap: $158 mill
Exploration	➢ Exploration projects in DRC and Zambia	

iii) The UK-Londoners

Table 4.12 Petra Diamonds (47,58, Appendix C1)

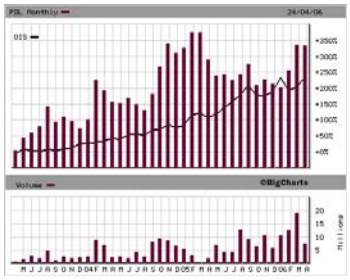
Company description	➢ Petra Diamonds is a mid-tier mining company focussed on the exploration and mining of diamonds in Africa, with projects operations in Angola, Botswana, South Africa, and Sierra Leone. ➢ A merger with ASX listed Crown Diamonds enhanced the capacity and portfolio of the company.	**Share price vs. Index** 
	Operations	**Resources and reserves**
Mines	➢ Star underground mine (SA) ➢ Helam fissure mine (SA) ➢ Messina and Dancarl operations (SA)	➢ Star: 1.3 Mt, 44 cpht ➢ Helam: 3.8 Mt, 81 cpht ➢ Messina and Dancarl: 1.9 Mt, 28 cpht
Mine development	➢ No mine development projects	**Financial**
Feasibilities	➢ No feasibility studies	➢ Market Cap: $196 mill
Exploration	➢ Alto Cuilo jv with BHP Billiton. ➢ Kalahari exploration	

Table 4.13 Jubilee Platinum (47,59, Appendix C2)

Company description	➢ Jubilee is an exploration company with a portfolio of platinum projects in South Africa, in close proximity to existing major operations. ➢ In Madagascar, the company is focusing on the exploration of nickel, copper and PGM assets.	**Share price vs. Index** 
	Operations	**Resources and reserves**
Mines	➢ No mining operations	Resources: 65 Moz PGM
Mine development	➢ No mine development projects	**Financial**
Feasibilities	➢ No feasibility studies	Market Cap: $42 mill
Exploration	➢ Tjate platinum exploration project (SA) ➢ Cu-Ni, PGM and AU concessions in Madagascar ➢ York platinum exploration in Sierra Leone	

Table 4.14 African Eagle (47,60, Appendix C3)

Company description	➢ African Eagle is listed on AIM and has a portfolio of gold and base metal properties in Tanzania, Zambia and Mozambique. ➢ The main focus is the identification of deposits in the highly prospective Lake Victoria gold field of Tanzania, where over 40Moz of gold has been delineated.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ No mining operations	No information , early stage exploration
Mine development	➢ No mine development projects	**Financial**
Feasibilities	➢ No feasibility studies	Market Cap: $12 mill
Exploration	➢ Lake Victoria gold exploration projects (Tanzania) ➢ Copper exploration projects in Zambia ➢ Iron oxide copper gold exploration projects in Zambia ➢ Gold exploration project in Mozambique.	

Table 4.15 Kenmare Resources (47,61, Appendix C4)

Company description	➢ Kenmare is a mine development company, whose main asset is the Moma Minerals Project located on the coast of Mozambique. ➢ Moma is in the construction phase and is the first major mining project in Mozambique.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ No mining operations	Resources: 469 mt, 4.3% THM
Mine development	➢ Moma project under construction: mining of heavy mineral sands with dredges, concentrate shipped in barges.	**Financial**
Feasibilities	➢ No feasibility studies	Market Cap: $494 mill
Exploration	➢ No exploration projects	

Table 4.16 Randgold Resources [47,62, Appendix C5]

Company description	➢ Randgold Resources is a gold mining and exploration company and a member of the FTSE 250 index. ➢ The company is primarily active in West Africa, Mali, where it has discovered and developed the 7 Moz Morila Mine and where it is developing the Loulo Mine.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ Morila opencast mine (Mali), 50 / 50 joint venture with AngloGold Ashanti	Morila ➢ Resources:3.5 Moz ➢ Reserves: 2.6 Moz Loulo ➢ Resources: 8 Moz ➢ Reserves: 1.8 Moz Tongon ➢ Resources: 2.9 Moz
Mine development	➢ Loulo openpit gold mining project under construction (Mali) .	**Financial**
Feasibilities	➢ Loulo underground feasibility study, focussed on the development of two underground mines. ➢ Togon openpit project (Cote d'Ivoire)	Market Cap: $553 mill
Exploration	➢ Gold exploration projects in Mali, Senegal, Tanania, Burkina Faso, Ghana and Cote d'Ivoire.	

iv) The South Africans

Table 4.17 Thabex (47,63, Appendix D1)

Company description	➢ Thabex is an exploration company with a diversified portfolio of mainly alluvial, near surface diamondiferous exploration projects in South Africa. ➢ Thabex also explores for coal, gold, platinum and base minerals.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ No mining operations	Limited information
Mine development	➢ No mine development projects	**Financial**
Feasibilities	➢ No feasibility studies	Market Cap: $2 mill
Exploration	➢ Pioneer alluvial diamond exploration project (South Africa) ➢ Taung diamond exploration project ➢ Pilanesberg gold exploration project ➢ Riveria base metal exploration project ➢ Salt River copper-lead-zinc –gold exploration project ➢ Potgietersrus platinum exploration project.	

Table 4.18 Metorex (47,64, Appendix D2)

Company description	➢ Metorex is a mid-tier multi commodity mining group, which specialises in owning and managing quality mining projects on a decentralized profit centre. ➢ The company has operating coal, gold and base minerals mines in South Africa and is currently developing the Ruashi copper tailings project in the DRC.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ Wakefield coal investments; 4 collieries in South Africa ➢ Barberton underground gold mine (South Africa) ➢ Consolidated Murchison underground antimony mine (South Africa) ➢ Vergenoeg fluorspar mine (South Africa) ➢ Chibuluma copper mine (Zambia)	<table><tr><th>Project</th><th>Resources</th><th>Reserves</th></tr><tr><td>Wakefield</td><td>2 mt</td><td>28 mt</td></tr><tr><td>Barberton</td><td>61,600 kg</td><td>17,314 kg</td></tr><tr><td>Cons Murch</td><td>7.9 mt, 2.6% Sb</td><td>.7 mt, 2.6% Sb</td></tr><tr><td>Vergenoeg</td><td>217 mt</td><td>10 mt</td></tr><tr><td>Chibuluma</td><td>1.5 mt, 3% Cu</td><td>7.6mt, 4% Cu</td></tr><tr><td>Ruashi</td><td>43 mt, 3% Cu, 0.5% Co</td><td>25mt, 3.7% Cu, 0.4% Co</td></tr></table>
Mine development	➢ Ruashi copper project in the DRC.	**Financial**
Feasibilities	➢ No feasibility studies	Market Cap: $454 mill
Exploration	➢ No exploration projects listed	

Table 4.19 SXR Uranium One / Aflease [47,65,66,Appendix D3]

<table>
<tr><td>Company description</td><td>➢ Aflease is a previous marginal gold mining company that has 1) reformulated its strategy, 2) merged with TSX listed Southern Cross Resources and 3) re-branded itself as a the new uranium focussed company SXR Uranium One.</td><td>Share price vs. Index
</td></tr>
<tr><td colspan="2">Operations</td><td>Resources and reserves</td></tr>
<tr><td>Mines</td><td>➢ No mining operations</td><td><table><tr><th>Project</th><th>Resources</th><th>Reserves</th></tr><tr><td>Dominion</td><td>162 m lbs Uranium</td><td></td></tr><tr><td>Bonanza</td><td>0.7 m lbs Uranium</td><td></td></tr><tr><td>Honeymoon</td><td>9.3 m lbs</td><td></td></tr></table></td></tr>
<tr><td>Mine development</td><td>➢ Dominion: previous underground gold mine which hosts large underground uranium deposit in South Africa.</td><td>Financial</td></tr>
<tr><td>Feasibilities</td><td>➢ Honeymoon Project: uranium feasibility study in Australia</td><td rowspan="2">Market Cap: $812 mill</td></tr>
<tr><td>Exploration</td><td>➢ Uranium exploration projects in South Africa, Australia and Canada</td></tr>
</table>

Table 4.20 DRDGold [47,67,Appendix D4]

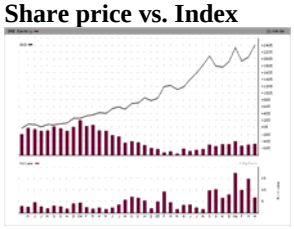
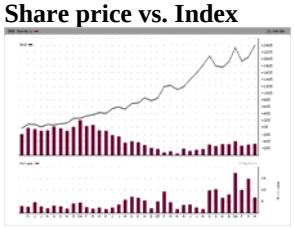
<table>
<tr><td>Company description</td><td>➢ DRDGold is an old South African mining house that has withstood various challenges and undertaken corporate restructuring in South Africa.
➢ The company owns deep level and surface gold mining operations in South Africa, Papa New Guinea and Fiji.</td><td>Share price vs. Index
</td></tr>
<tr><td colspan="2">Operations</td><td>Resources and reserves</td></tr>
<tr><td>Mines</td><td>➢ Blyvoor: underground mining and tailings recovery operations (South Africa)
➢ North West Operations: liquidated operations in South Africa
➢ Crown Gold tailings recovery operation (South Africa)
➢ ERPM underground gold mine (South Africa)
➢ Tolukuma and Porgera mines (Papua New Guinea)
➢ Emporer Mines (Fiji)</td><td><table><tr><th>Project</th><th>Resources</th><th>Reserves</th></tr><tr><td>Blyvoor</td><td>27 Moz</td><td>4 Moz</td></tr><tr><td>Crown</td><td>1.7 Moz</td><td>10 Moz</td></tr><tr><td>ERPM</td><td>2.7 Moz</td><td>0.3 Moz</td></tr><tr><td>Tolukuma</td><td>0.5 Moz</td><td>0.2 Moz</td></tr><tr><td>Porgera</td><td>2.3 Moz</td><td>1.3 Moz</td></tr><tr><td>Emporer</td><td>2.1 Moz</td><td>0.3 Moz</td></tr><tr><td>Argonaut</td><td>111 Moz</td><td></td></tr></table></td></tr>
<tr><td>Mine development</td><td>➢ No mine development projects.</td><td>Financial</td></tr>
<tr><td>Feasibilities</td><td>➢ Argonaut deep level gold project (SA)</td><td rowspan="2">Market Cap: $481 mill</td></tr>
<tr><td>Exploration</td><td>➢ Exploration project in Papua New Guinea</td></tr>
</table>

Table 4.21 Barplats [47,68,Appendix D5]

Company description	➢ Barplats is a platinum group metals company, whose core business is PGM mining and processing in South Africa's world-renowned Bushveld Igneous Complex (BIC). ➢ The company has two assets: the Crocodile River Mine on the western limb and Kennedy's Vale Project on the eastern limb of the BIC.	**Share price vs. Index** 
Operations		**Resources and reserves**
Mines	➢ Crocodile River Mine: underground platinum mine that has been restarted after care and maintenance.	Crocodile Resources: 10 Moz Reserves: 1.3 Moz Kennedy's Vale Resources: 28 Moz
Mine development	➢ No mine development projects.	**Financial**
Feasibilities	➢ Kennedy's Vale platinum project	Market Cap: $357 mill
Exploration	➢ No exploration projects	

4.2.3 Determining Top, Medium and Poor Market Performers

The twenty junior mining companies are categorized into top, medium and poor market performers. The reason is that the strategic and tactical game plan elements of those junior mining companies that the market perceives to be superior need to be understood. This will allow a game plan to be constructed according to that of top performers and avoid the pitfalls of poor performers.

The assessment of the junior mining companies was based on an analysis of the share price as well as the profitability of the company. In order to determine the share price performance of the company, the author plotted for each company the three-year share performance against the Dow Jones Global Exploration and Mining Index, as provided in the Financial Times Market Watch website [47]. In a period of commodity upswing, most company share prices rise. The determining criterion was how the junior mining company share price fared against the Index**.** The share prices of the companies were

analyzed in a simplistic way by asking five questions. For every "Yes" answer, the company scored a point. The five questions are as follows:

1. Does the share price end above the index at the end of the evaluation period? Yes/ No
2. Has there been continual growth of the share price? Yes / No
3. Despite share price falls, have there been periods where the share price has seen growth over an extended period? Yes/No
4. Has the share price been above the index for more than 50% of the 3 year time period? Yes/ No
5. Have there been periods over which the share price has increased above the rate of increase of the index? Yes / No

The next analysis that was undertaken was profitability. Whilst it is true that many junior miners are speculative and do not incur any revenues, profitability is a measure of success. These days, shareholders want to see that the company is self-sustainable and not continuously seeking shareholder equity for future projects. Two questions where asked:

6. Is the company profitable during the period under review? Yes/No
7. Has the profitability of the company increased? Yes/No

Again, for every "Yes" answer, the company scores a point. The share price movement is allocated a 71% weighting (5 out of 7) in the overall score, while the profitability weighed 29% (2 out of 7). The reason is that in junior mining, the share price increase is more reflective of value than profitability. The scores of the companies are plotted against one another in Figure 4.2.

The companies are then classified simplistically into top, medium and poor market performers as follows:

- Top market performers: scores ranging between 7 and 5

- Medium market performers: scores below 5 and above 2.5
- Poor market performers: scores below 2.5

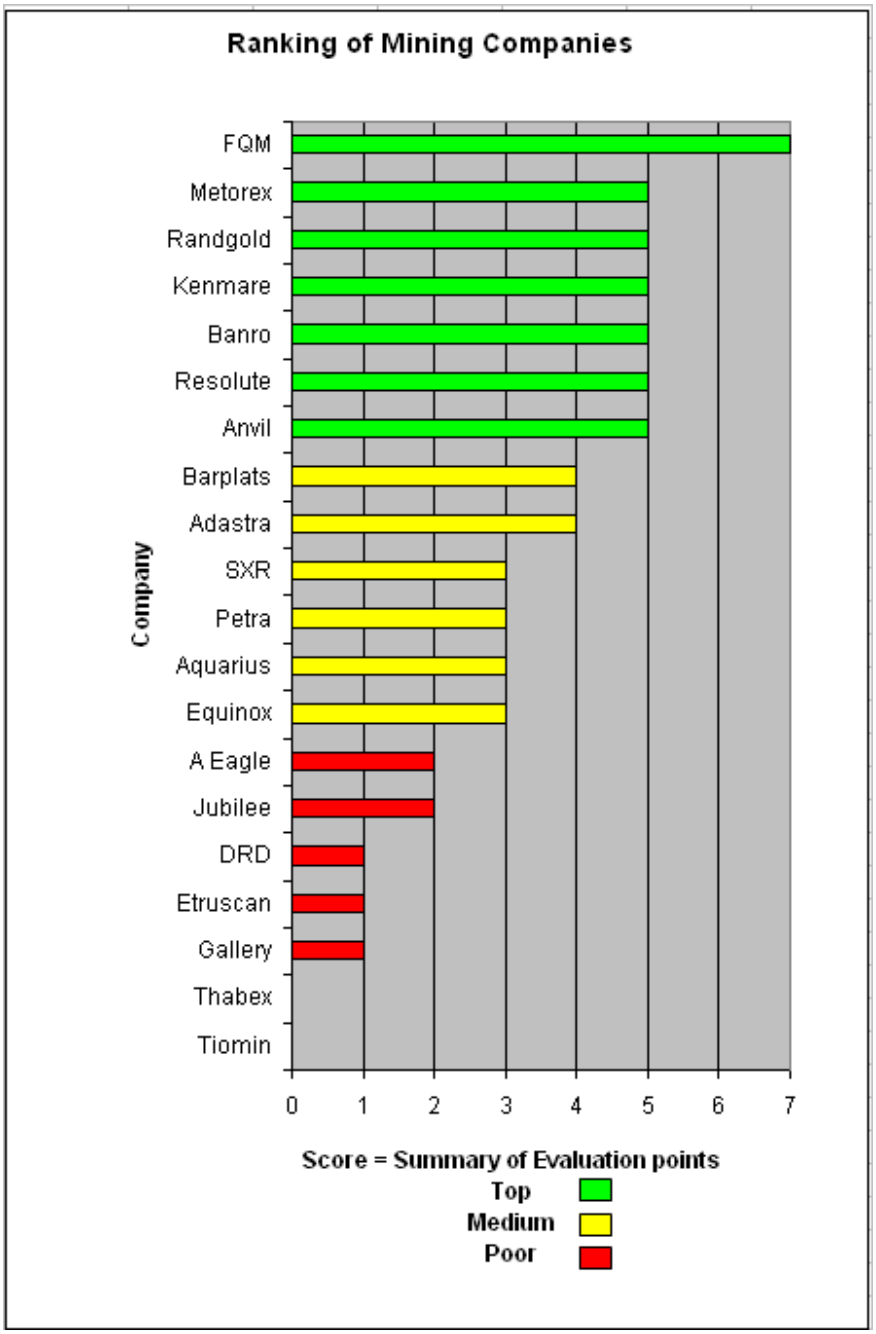


Figure 4.2 Top, medium and poor performers

Results: (Score maximum 7, minimum 0)

Top market performers: (Companies with a score between 7 and 5). The most superior performer is First Quantum Minerals (FQM) with a score of 7. Metorex, Randgold Resources, Kenmare, Resolute and Anvil follow as the next grouping with a score of 5. These are companies that will be analysed in detail throughout the thesis.

Medium market performers: (Companies with a score of below 5 and above 2.5). Barplats and Adastra lead the medium performer group at an average of 4. SXR Uranuim One, Petra Diamonds, Aquarius and Equinox score at 3 respectively and represent the lower grouping.

Poor market performers: (Companies with a score of below 2.5). African Eagle and Jubilee score each score 2. DRD, Gallery Gold and Etruscan come in with a score of 1. Thabex and Tiomon both score zero and are the poorest market performers.

4.3 Databases

4.3.1 Database 1: Strategies of top Junior Mining Companies

The first database encompasses strategies of top market performing junior mining companies. One can deduce that these are strategies of which the market approves.

Database 1. Strategies of the top junior mining companies

- ✓ Expansion in one area – e.g. Copperbelt (First Quantum)
- ✓ Focus on the core expertise of developing and operating mines as well as discovery of new deposits (First Quantum)
- ✓ Developing a significant resource base in the DRC (Banro)
- ✓ Focusing solely on the successful execution of one project (Kenmare)
- ✓ Creating an active pipeline across the entire mine project value chain (Randgold Resources)
- ✓ Decentralized management of diverse assets, with rigid cost control and operational leanness (Metorex)
- ✓ Disposal of non-core assets and using proceeds to acquire a new mine (Resolute)
- ✓ Staged development, using cashflow to finance new ventures (Anvil)
- ✓ Capitalising on the first mover status in the DRC (Anvil).

In Table 4.22 the detailed missions and strategies of the top junior mining companies are outlined.

Table 4.22 Strategies of top junior mining companies

Company	**First Quantum** (47,57, Appendix B5)	**Banro** (47,55, Appendix B3)	**Kenmare** (47,61, Appendix C4)	**Randgold Resources** (47,62, Appendix C5)
Mission	✓ Build a mid-tier copper producer. ✓ Focus on the core expertise of developing and operating copper mines as well as discovery of new copper deposits in the Copperbelt in the DRC and Zambia.	✓ Create shareholder value by defining and developing significant gold resources in the DRC. ✓ Objective in 2005: double resources to 4 Moz	✓ Become a titanium producer and successfully commission the mine development project, Moma.	✓ Achieve superior returns for shareholders through the development and management of resource opportunities focussing on gold discovery and development
Strategy	✓ The operation of low cost mines ✓ Leveraging the strategic advantage of the company being well positioned in the Copperbelt ✓ Focussed and cost effective exploration, identifying drill targets in the Copperbelt ✓ Using in-house management expertise to build new mines for less capital than industry norms. ✓ Expanding internationally through the acquisition of mines that are unsuitable for major mining companies ✓ Ensuring that the company has the right management team to capitalize on opportunities. ✓ The promotion of health and safety ✓ Developing the company's employees ✓ Enrichment of the environment and communities in which the company operates.	✓ Focused on regions in the DRC, which have had historic mining activities and little exploration over the past half-century. ✓ Position the company to benefit from the economic, social and political recovery of the DRC, a country is one of the richest natural resource countries of Africa and has seen very little exploration over the past half-century. ✓ Design the exploration program to firm up the resource base and determine blue-sky potential. ✓ Establishment of a focused, new leadership team to execute the strategy. ✓ Secure strong support from institutional investors in North America, the U.K. and Europe.	✓ Focus solely on the successful management of the construction process and ramp up to full production of the Moma Project. ✓ Key strategic focus areas in 2006 were: ✓ Marketing: concluding a heads of agreement with major consumers for the supply of sulphate grade ilmenite ✓ Purchase of new exploration equipment ✓ Securing a structured finance package for Moma.	✓ Global stakeholder approach: The shareholders are mainly American, the Board of Directors and management team South African, British and French speaking and the operations are run by locals. ✓ Use of a mine as platform to enter and expand on a region: Randgold has been using the Loulo Mine as platform to expand into the West Mali gold region and the goldfields of eastern Senegal. ✓ An active pipeline of projects along the entire mine project value chain ✓ Exploration is the foundation of its business ✓ Pre feasibility study: the Togon project ✓ Feasibility Study: the Loulo U/G Development Study ✓ Mine Development Project: Loulo Gold Mine ✓ Mine: Morila Mine ✓ Motivated hands–on employees who do "what needs to be done" to make Randgold Resources grow.

Table 4.22 Strategies of top junior mining companies (cont'd)

Company	Metorex (47,64, Appendix D2)	Resolute (47,51, Appendix A4)	Anvil (47,48, Appendix A1)
Mission	✓ Grow mining activities in Southern Africa by acquiring, developing and managing a diversified portfolio of quality mineral resource projects. ✓ Create wealth for all stakeholders by the efficient management of its mining companies and deliver financial growth for the company's shareholders.	✓ Build shareholder value through the perceived strength as a successful developer and operator of quality gold projects.	✓ Become an expanding copper growth company which is developing the resource potential of the DRC.
Strategy	✓ Acquire and manage long life, high quality operations that diversify risk and provide sustainable earnings growth; ✓ Dispose of non-core marginal mines and develop a quality portfolio of long-life mining and mineral assets; ✓ Maximize the return of investment ✓ Sustain an appropriate company culture ✓ Develop a market profile which provides wealth and income for shareholders. ✓ Operated on a decentralised management principle, with each subsidiary company operating as a self-standing, independent unit, responsible for the implementation of the strategic plans agreed upon at Board level. ✓ Natural caution, operational leanness, controlled overheads, rigid cost control, strong accountability, efficient capital expenditure, utilisation of specialist consultants and a quality orebody. ✓ Focus beyond the borders of South Africa, as a result of limited opportunities in the SA mining industry.	✓ Disposal of non core assets: Resolute has profitably sold AGR Limited, Gallery Gold Limited and Red Back Mining NL and exploration assets for A$ 34 mill . The cash has been directed into existing assets, such as the Ravenswood and Syama Mine. ✓ Asset purchase: Purchase Ravenswood Mine from Xstrata at cost of $45 mill, elevating Resolute into the third biggest Australian domiciled gold producers. The Ravenswood mine is a mine optimization challenge with a rejuvenation plan. ✓ Capital raising of A$14 mill through an issue of shares to institutional resource investors to partially fund the US$13 mill acquisition of the Syama Gold Project in Mali. ✓ Restructuring of the hedge book.	✓ First Mover Status: The company, being one the first junior mining companies with projects in the DRC is intent on capitalising on this first mover status in the DRC. ✓ Staged development approach: Anvil has started its copper mining venture project in phased manner. The first projects produced combined 30,000 tpa cathode copper within the first 2-3 yrs. The operations were then expanded to 45-60,000 tpa. Within five years the company wants to move to mid-tier producer status 75,000 tpa. ✓ Cashflow to finance venture: The company subscribes to the approach of minimum initial capital investment of its mining ventures, with upgrades financed from internally generated cashflow. ✓ Move into new market: the company plans to enter the cobalt market shortly. ✓ Resource and reserve base: Anvil wants to increase the reserve base 3-4x by 2005 and prove up resource potential for 15-20 years life of mine. ✓ Risk philosophy: the company claims that it can balance risk and reward in its approach. ✓ Team: A strong management team with African experience. ✓ Sustainability: building strong partnerships with the community, where its operations are located.

4.3.2 Database 2: Junior Mining Company Deal Structures

The author explored the legal deal structures of selected junior mining companies to develop a database for deal structuring of junior mining companies. The deal structures of the junior miners Equinox, Adastra and Randgold Resources were reviewed and analysed. To understand the complete legal and deal structuring, a review of the company history, corporate structure, mining asset, legal contracts, government interaction and financing arrangements are required. Structures can be simple or highly complex.

In summary, many junior mining companies hold the following generic structure: A holding company close to mining capital markets, where the company is listed. The holding company holds 100% of the operational company, which is located in the host country of the mining asset. The operational company is the majority shareholder of the mine, project or exploration licences. At a mining asset level, deals are structured with local communities and BEE shareholders. Legal contracts determine the relationship between mine and client, projects and contractors and local licence holders, with whom agreements are concluded. Bank loans are directed at the asset level.

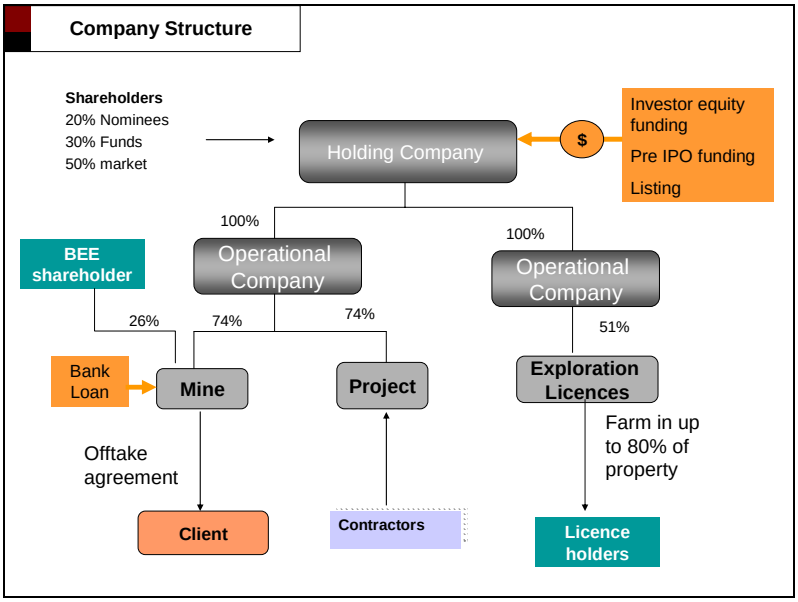


Figure 4.3 Generic company structure

Database 2. Deal Structures

Table 4.23 Deal structure: Equinox [49]

Corporate information

Company History

- ✓ Equinox has been an active explorer since 1994.
- ✓ The company is listed on the ASX and dual listed on the TSX in 2004.

Corporate Structure

- ✓ The main shareholders are:
  - ✓ CDS and Co: 16.76%
  - ✓ National Nominees: 10.62%
  - ✓ Auselect Limited: 5%
  - ✓ Billiton Exploration Australia 4.8%
  - ✓ CR Williams Family Trust: 3.18%

Mining asset

- ➢ The only mining asset is the Lumwana feasibility study. Lumwana is an underdeveloped copper deposit. The forecasted capex is $296 mill**.**

Legal

- ✓ Equinox acquired 51% of the Lumwana project from Phelps Dodge and has secured an option to acquire a further 49%. The conditions are payment of $10.6 mill to Phelps Dodge on deciding to develop the project and payment of a further $12.8 mill on commencement of production.

Financing

- ✓ The European Investment Bank has provided a €7 mill loan at an interest rate of 5.3% per annum
- ✓ A syndicate comprising RMB, Societe general, SA Export Capital has provided a €7 mill note facility

Transaction Partner

- ✓ Phelps Dodge

Deal Structuring

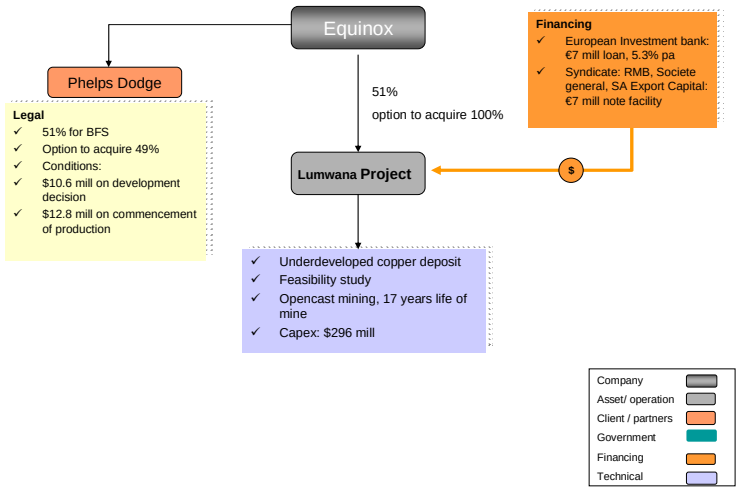


Table 4.24 Deal structure: Adastra [54,78,79]

Corporate information

Company History

Company History

- ✓ 1995: Inception to develop Brazilian diamond interests
- ✓ 1997: won tender to develop the Kolwezi Project
- ✓ 1998: Formed joint venture with Anglo American to develop Kolwezi
- ✓ 1999: Umicore acquired 11% stake in the Kolwezi Project
- ✓ 2003: Purchased 50% of Anglo American's AAC stake in Congo Mineral Development, which holds 82% of company KMT which in turn holds 100% of Kolwezi tailings.

Corporate Structure

Adasta has a complex corporate structure. There are various shareholding entities between Adastra and the prime mining asset:

Mining asset

- ✓ Adastra has two mining assets, the Kolwezi tailings project, being the main project and the Kipushi project.
- ✓ The Kolwezi tailings project is a 112 Mt tailings dam with grades of 1.5% Cu and 0.3% Co. The plan is to develop a tailings recovery operation that produces 30,000 tpa Cu, 5500 tpa Co. The project is at a feasibility stage.
- ✓ Kipushi is a pre-feasibility study on the re-opening of an old underground mine in the DRC**.** The resource is 16 Mt at a grading of 16% Zn and 2.2% Cu.

Legal

- ✓ Cobalt processing and marketing company, Umicore, acquired 11% of Adastra by acquiring 3.5m shares. Umicore has become an equity partner with the intention of marketing and processing cobalt.
- ✓ Kumba's subsidiary Zincor has signed an option with Adastra to participate in the redevelopment of the Kipushi mine. Kumba has the right to earn 50% for $3.5m.
- ✓ A joint venture has been concluded with Anglo American to develop the project. Anglo was paid $8mill for shares in CMD. Further, Adastra acquired all of Anglo's shares for $3.5m.
- ✓ DRC government: the government transaction partner is Gecamines. In 2003 a Heads of Agreement was signed to acquire 82.5% of the Kolwezi project for $15m. In 2004 a Contract of Association with DRC Government and Gecamines was signed and a Presidential Decree awarded.
- ✓ Adastra has appointed the following contractors and suppliers to develop the Kolwezi Project.: MineNet, SRK, MandR, GRD Minproc, Mintek, Hatch.

Financing

- ✓ The capital expenditure to develop Kolwezi is $278 million.
- ✓ In 2003, Adastra undertook a secondary listing on AIM, in which $20 million were raised.
- ✓ In 2005 C$10 million were raised in a private placement.

Transaction Partner

Umicore , Zincor, Anglo American , Gecamines

Deal Structuring

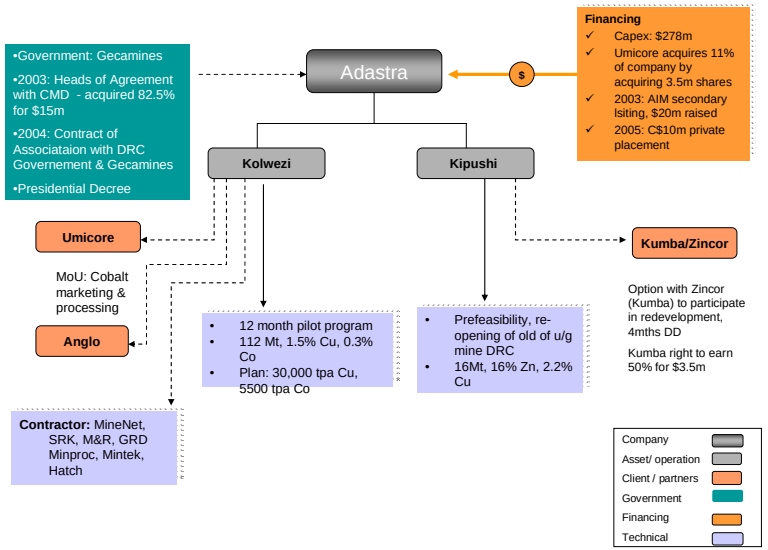


Table 4.25 Deal structure: Randgold Resources [62,80,8182]

Corporate information

Company History

- ✓ 1995: Randgold Resources incorporated
- ✓ 1996: BHP Minerals Mali acquired, discovered Yalea and Morila
- ✓ 1997: IPO and listing on LSE, gold price starts to slump
- ✓ 1998: IFC loan for expansion of Syama; discovered Tongon
- ✓ 1999: Gold price at 20 year low, go-ahead for Morila
- ✓ 2000: Half of Morila's interest sold, Morila pours first gold
- ✓ 2001: $81mill returned to shareholders, Syama operations suspended
- ✓ 2002: Nasdaq listing, Morila produces 1 Moz in one year
- ✓ 2003: Net profit of $47.5 mill, cash grows to $100 mill
- ✓ 2004: Work starts on new Loulo mine, Syama sold
- ✓ 2005:Loulo Gold Mine commissioned and in production

Corporate Structure

The major shareholders are:

- ✓ Institutions: 59.77%
- ✓ US retail ADR and brokerage: 30.26%
- ✓ Randgold and Exploration: 6.72%
- ✓ UK retail and other: 1.94%
- ✓ Management: 1%

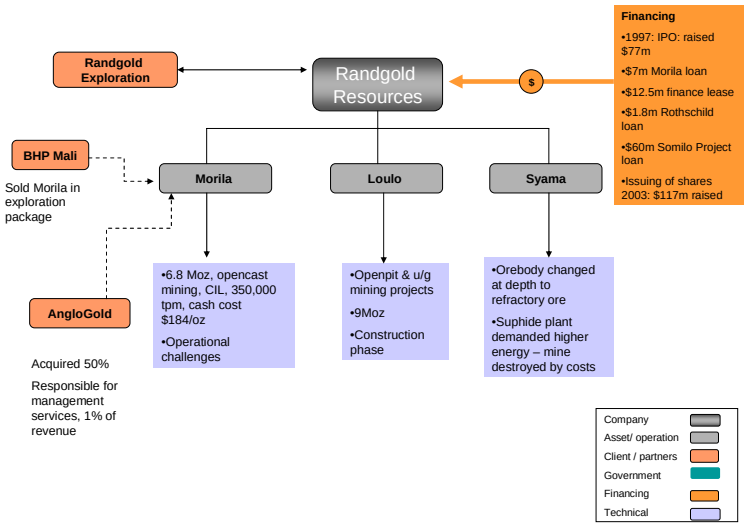
Mining asset

- ✓ Syama Mine was the first principal asset of Randgold Resources. Randgold acquired the asset from BHP, but had to close it in 2001 as the orebody changed at depth to refractory ore, leading to uneconomically high energy costs for processing. In 2005, Randgold Resources sold 80% of the mine to Resolute for $6 mill and a royalty of $10/oz
- ✓ Morila Mine is an opencast gold mine. The mine has reserves and resources of 6.8 mill oz and it produces 350,000 tpm at a cash cost of $184/oz. The mine is managed by AngloGold and experiencing operational challenges.
- ✓ The third main asset is the Loulo mine development project, a 9 million oz openpit mine in a construction phase.

Legal

- ➢ There is a complex relationship between Randgold Resources and Randgold Exploration. Simplified, the relationship in legal terms can be summarised as follows: Randgold Exploration is listed on the JSE and subject to SA Foreign exchange control limitations. The company established Randgold Resources firstly to raise money on international stock markets and to enable South African mining investors to participate in junior mining opportunities in West Africa.
- ➢ Randgold Resources acquired Syama in 1996 from BHP for $27m. A loan was issued from Randgold Exploration to Randgold Resources to this effect. Unlisted Randgold Resources issued 12 million shares to Randgold Exploration, increasing the value of Randgold Resources from

Deal Structuring



$5m to $310m. ➢ A further loan of $23 million was converted into Randgold Resources shares. ➢ At the IPO, Randgold Resources raised $77m of which it paid $30m debt to BHP and converted the $18million Randgold Exploration loan to shares. ➢ Anglogold Ashanti acquired 50% of Morila and is responsible for management services for which it is paid 1% of revenue. **Financing** ➢ Equity financing: The 1997 IPO raised $77m. ➢ Debt financing includes a $7m Morila loan, a $12.5m finance lease, a $1.8m Rothschild loan, and a $60m Somilo Project loan. ➢ In 2003, the company issued new shares and raised $117 mill. **Transaction Partner** ➢ Randgold Exploration ➢ BHP ➢ Anglogold Ashanti	

4.3.3 Database 3: Financial Performance of Junior Mining Companies [48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,67,68]

Financial Statements are a reflection of the business performance, that is, a financial scoreboard. The purpose of this section is to review the financial performance of the twenty junior mining companies with the intention of creating a database with benchmarks for financial performance. The Annual Financial Reports available to the public over the period November 2005 – February 2006, were analysed, particularly the income statements, balance sheets, consolidated cash flow statements and financial ratios. Where required, the relevant data was converted to US$, at the prevailing exchange rates. A statistical analysis was then undertaken, to determine maximum, minimum, average and standard deviation values, as well as values for the top market performers. This analysis provided a detailed comparison of top, medium and poor market performers. The following was analysed:

Profitability

- ✓ Net profit/loss=profit / loss after tax

Assets and liabilities

- ✓ Debt ratio = total liabilities / total assets

Cashflow – $ available for junior mining business

- ✓ Cash at end period

Price / earnings ratio

- ✓ P/E ratio= market price per share/ earnings per share

i) Profitability of Junior Mining Companies

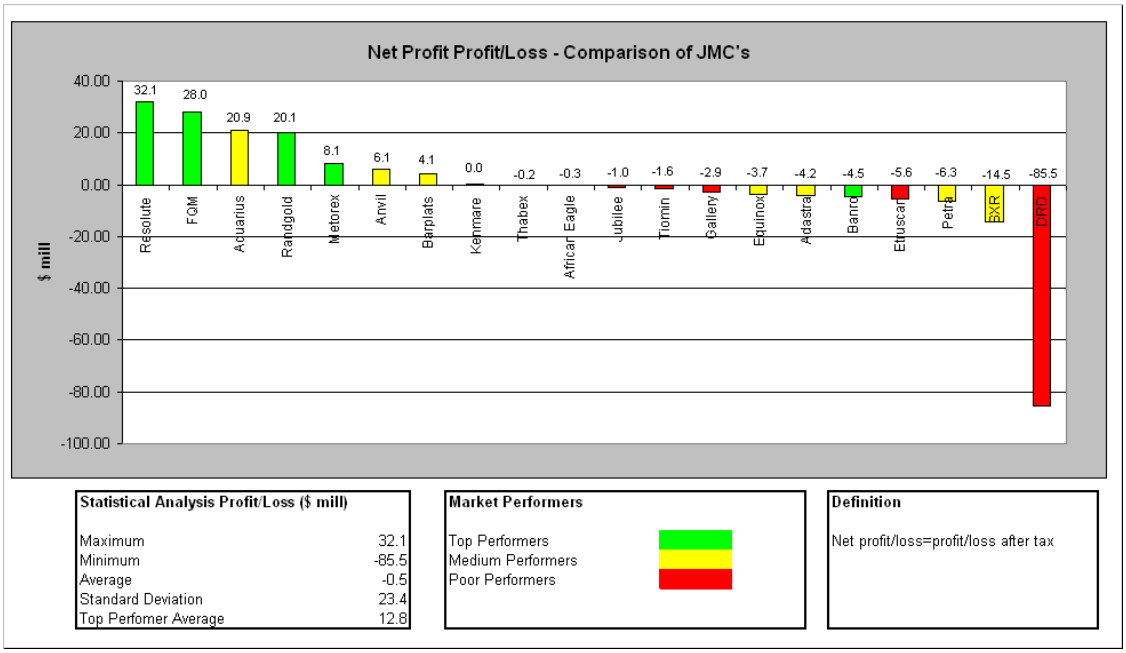


Figure 4.4 Net profit / loss – comparison of JMC's

On average, the twenty junior mining companies are loss makers, at a loss of $0.5million for the reporting period. The majority of top performers are, however, profitable, at an average profit of $12.8 million. Only one top performer is negative, Banro, a pure gold explorer. One loss maker stands out above the rest, DRD Gold, at a loss of $85 million!

The following can be deduced: the game of junior mining is mainly about capital appreciation, rather than making a profit. However, if the player wants to develop a market winner, the company needs to be profitable and, to achieve this, it needs a profitable operation.

ii) Debt Ratio of Junior Mining Companies

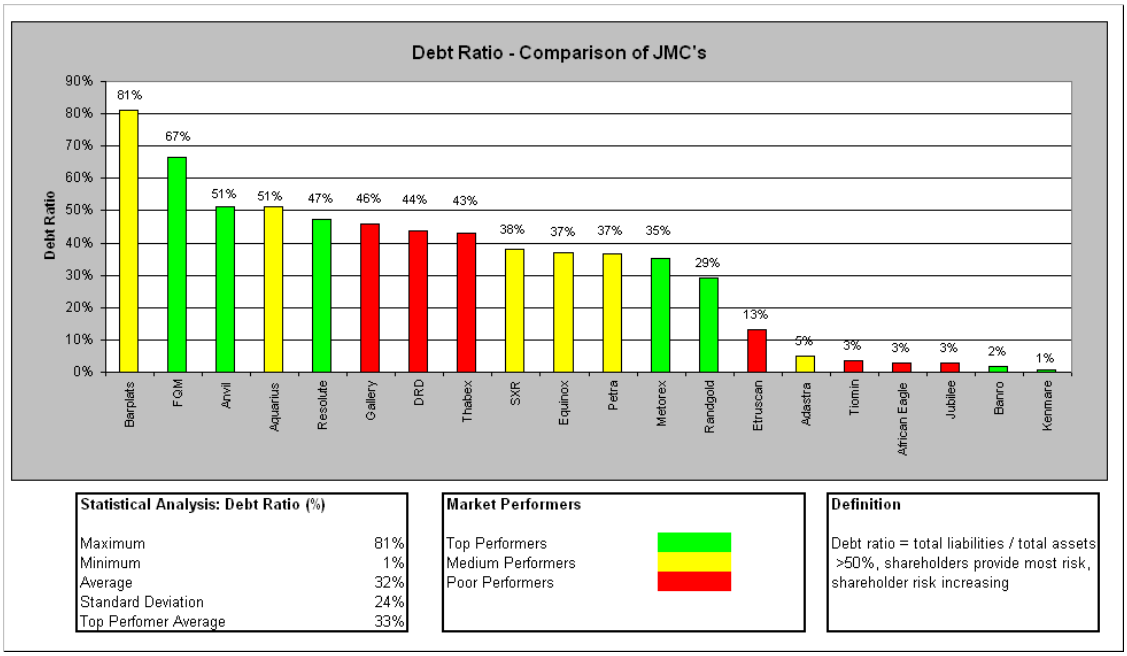


Figure 4.5 Debt ratio – comparison of JMC's

The average debt ratio is 32%, meaning that juniors rely mainly on equity finance. The top performers have structured themselves at an average debt ratio of 33%. However, First Quantum and Anvil have debt ratios of above 50%, a benchmark number indicating that shareholders are taking on more risk for these companies. Pure explorers and developers Adastra, Tiomin, African Eagle, Jubilee, Banro and Kenmare have debt ratios of below 5%, meaning that they rely almost entirely on raising equity capital in the market.

iii) Cashflow of Junior Mining Companies

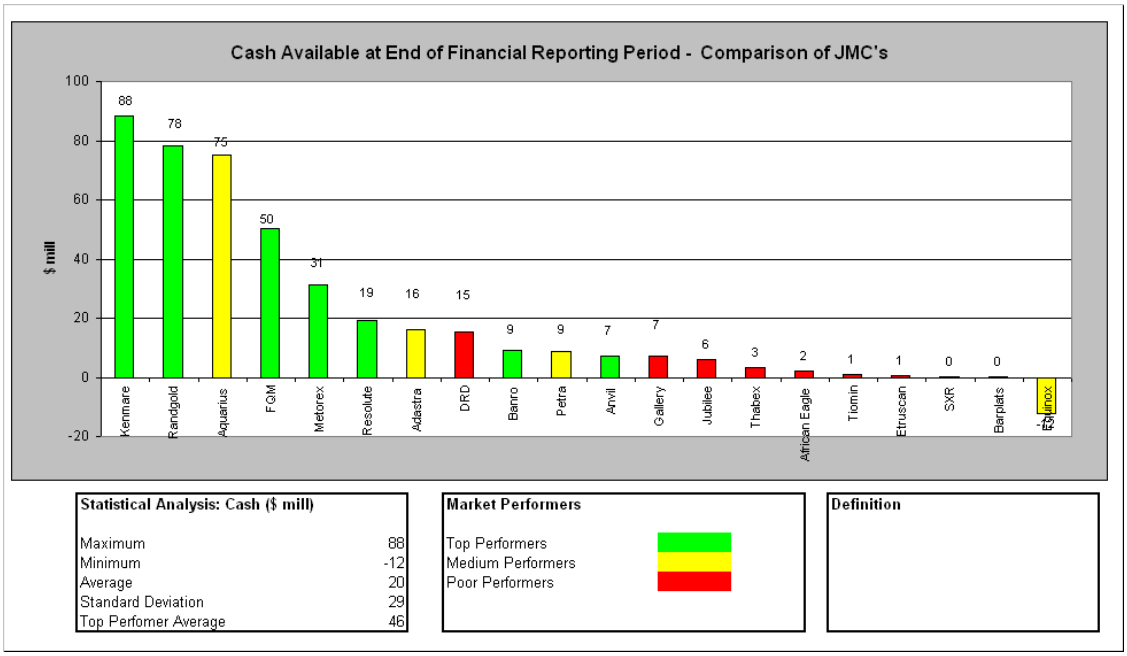


Figure 4.6 Cash available at end of financial reporting period – comparison of JMC's

It is clear that junior mining companies require cash in order to develop the project. The author believes "cash available at the end of the financial reporting period" is an important measure, as it indicates the extent of financial reserves available to the junior for project development. This measure also shows how soon the company needs to go back to the market to raise more capital or go to financial institutions to raise debt. On average, the analysed juniors have $20 million cash available, but the standard deviation is extensive at $29 million. The top performers have an average of $46 million of cash available, ranging from $88 million (Kenmare) to $7 million (Anvil).

A concern to some companies on the lower end must be the little financial reserves available, specifically companies with mining assets being developed or existing mining operations. Companies such as Etruscan, SXR Uranium One, Barplats and Equinox face this reality. An imminent market raising exercise is crucial for these players to remain in the game. Equinox has a deficit in the bank account and needs immediate cash, or faces closure.

iv) Price Earnings Ratio of Junior Mining Companies

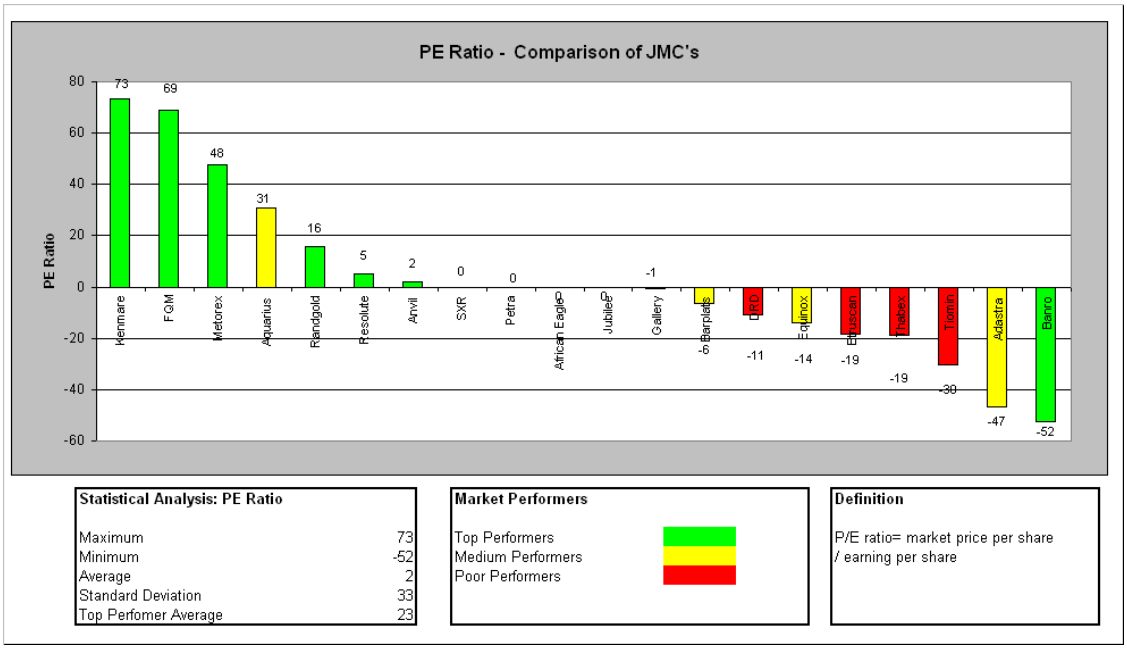


Figure 4.7 PE ratio – comparison of JMC's

The PE ratio is a measure of price and earnings per share. This ratio is an important measure for investors for benchmarking their investments. This analysis shows that the PE ratio varies extensively, from a maximum of 73 to a minimum of -52, the average being a PE of 2. The top performers have a PE ratio of 23. This figure would have been larger, would it not have been for the extremely negative PE ratio of Banro at -52.

Most of the companies with positive PE ratios have operations. These are the companies First Quantum, Metorex, Aquarius, Randgold, Resolute and Anvil. Companies with negative PE ratios are explorers. These companies have no income yet. Two companies stand out: DRD and Etruscan - these companies have operations, but these are loss makers.

4.3.4 Database 4: Operations Management System [83]

This database for the game plan relates to the management of the mining asset, the operational mine or mine being developed. Any player of the junior mining game will be confronted with the requirement of an operations management system (OMS). The OMS is defined as follows:

- It is a self-sustaining tool for mine management.
- It organises and links facts together in a logical manner.
- It is the mine's key communication tool for daily results.
- It allows mine management to make intelligent business decisions, as management constantly needs to know the status of conformity to production, equipment, manpower, quality and cost.
- The system allows managers on the mine to identify variances to the plan, take corrective action, make timely decisions and evaluate the effectiveness of their management intervention.
- It allows the mine's management to schedule the production, equipment and manpower according to the work requirements.

The typical OMS systems layout is provided in Figure 4.8.

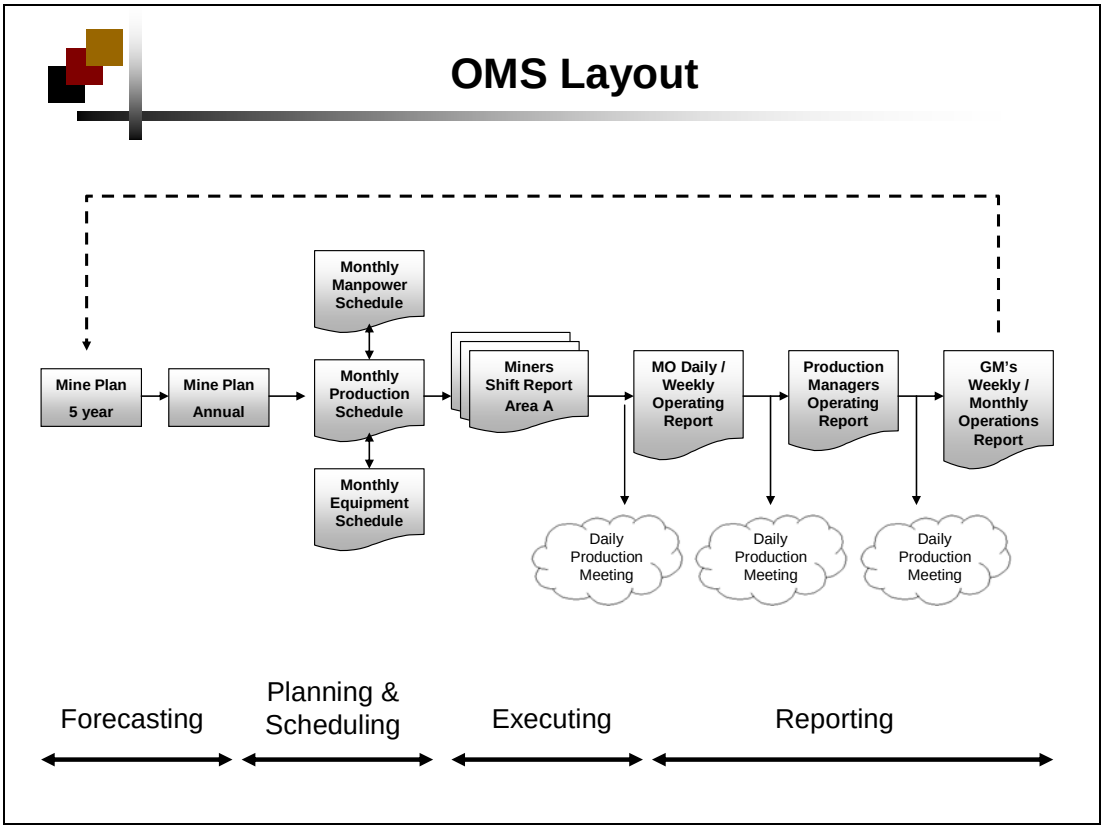


Figure 4.8 Generic OMS layout

The simplistic OMS has four elements:

- **Forecasting:** This entails the five year plan, broken down into an annual mine plan.
- **Planning and scheduling:** The annual mine plan is broken down into a monthly production schedule. To ensure that the monthly mine plan is achieved, a monthly equipment and manpower schedule is developed.
- **Executing:** This element relates to physical execution of the mining operation. The system elements are the miners' shift report and the daily production meeting, where day-to-day performance is measured, root causes are discussed and actions are planned.
- **Reporting:** The operations activities are summarised in Mine Overseer, Production Manager and General Manager Reports. At each level, there is a corresponding production meeting. The summarised reports provide feedback into the five yearly and annual mine plan.

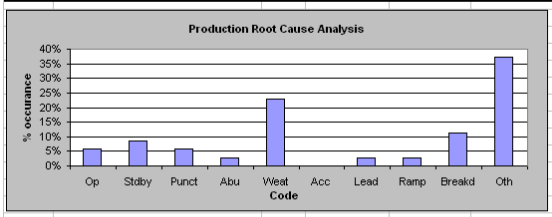
Major mining houses take the concept and expand it significantly into all areas of their business processes, using highly sophisticated IT tools and software programs, to break down each element into extreme detail. The game player need not become an expert in developing a sophisticated system, but he or she must be aware that these elements are crucial for the successful management of a mining asset. A basic system can be quickly developed in Excel and will serve its purpose of being a tool to manage the operation.

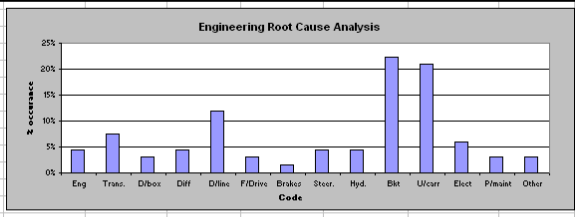
A typical daily management report is presented below in Figure 4.9.

DAILY MANAGEMENT REPORT — **MINE X**

March-07

Dept	KPI	UoM	6-Mar-05 Daily Plan	Mon	Tues	Wed	Thur	Fri	Sat	Weekly Analysis Plan	Act	Var
Safety	Accidents	#	0	0	0					0	0	0
	Incidents	#	0	0	0	0				0	0	0
	Cost of occurance	#	0	0	0	0				0	0	0
Mining	Drilling	m	200	200	100	10				1,000	310	-690
	Blasting	m3	40,000		20,000					200,000	20,000	-180,000
	Overburdon	m3	8,000	28,753	0					40,000	28,753	-11,247
	Ore	tons	4,000	0	2,000					20,000	2,000	-18,000
Eng	Truck availability	%	85	76	74					85	75	-10
	Excavator availability	%	85	82	88					85	85	0
	Support fleet availability		85	82	77					85	79.5	-5.5
Proc.	Ore processed	tons	4,000	2,000	3,000					20,000	5,000	-15,000
	Mineral product	tons	2,600	1,000	3,000					13,000	4,000	-9,000
	Product inventory	tons	100,000	80,000	81,000					100,000	81,000	
Trans	Product transported to market	tons	2,600	12,036	42,976					13,000	55,012	42,012
Quali	Mineral product KPI 1		x									
	Mineral product KPI 2		x									
Manp	# People - inhouse	#	130	129	129					130	129	-1
	# People -contractors	#	29	41	43					29	47	18
Controllable costs - monthly status	Drilling & blasting	R	80,000	-	120,000					400,000	120,000	-280,000
	Fuel	R	15,000		45,000					75,000	45,000	-30,000
	Maintenance	R	20,000	3,000	12,000					100,000	15,000	-85,000
	Tyres	R	2,000		22,000					10,000	22,000	12,000
	Ground engaging tools	R	2,000	2,000	2,000					10,000	4,000	-6,000
	Processing costs	R	50,000	45,000	52,000					250,000	97,000	-153,000
	Equipment Rentals	R	10,000	8,000	8,000					50,000	16,000	-34,000





SUCCESSES AND SHORTCOMINGS	
Successes	**Shortcomings**
managed to reduce equipment rentals	Mining of ore - need to start
	Low product inventory
	Support fleet availability

Figure 4.9 Example - daily management report

The Daily Management Report represents the key areas to be managed on a mine: safety, mining, engineering, processing, quality, manpower and controllable costs. Each area is defined by key performance indicators (KPIs) which have a unit of measure (UoM). Each

KPI has a daily plan, which is then summarised into a weekly analysis, which displays the weekly plan, actual and variance. Root causes for not achieving target are displayed graphically, highlighting areas which need attention. Daily, major successes and shortcomings listed.

The sheet is all-encompassing for the game player and it provides a summarised picture of the mining asset performance on one page. It can now be rolled upwards to a monthly, quarterly and annual basis, or down wards, where each areas is broken down into further KPIs, that are measured on an hourly basis. It is not the scope of this thesis to go into such detail, but to provide the concept of the OMS to the game player.

4.3.5 Database 5: Mine Optimisation [83]

This database for the game plan relates to the optimisation of the mining asset, that is, obtaining maximum profitability from the mining operation.

The author has dealt with this process in detail working as a mining consultant for a renowned management consulting company on mine optimisation projects in Ghana, Peru, Ireland and South Africa. The principle of mine optimisation is the following: the mining operation is represented (as defined in Chapter 3.5.4) as a process of micro-businesses, as displayed in Figure 4.10.

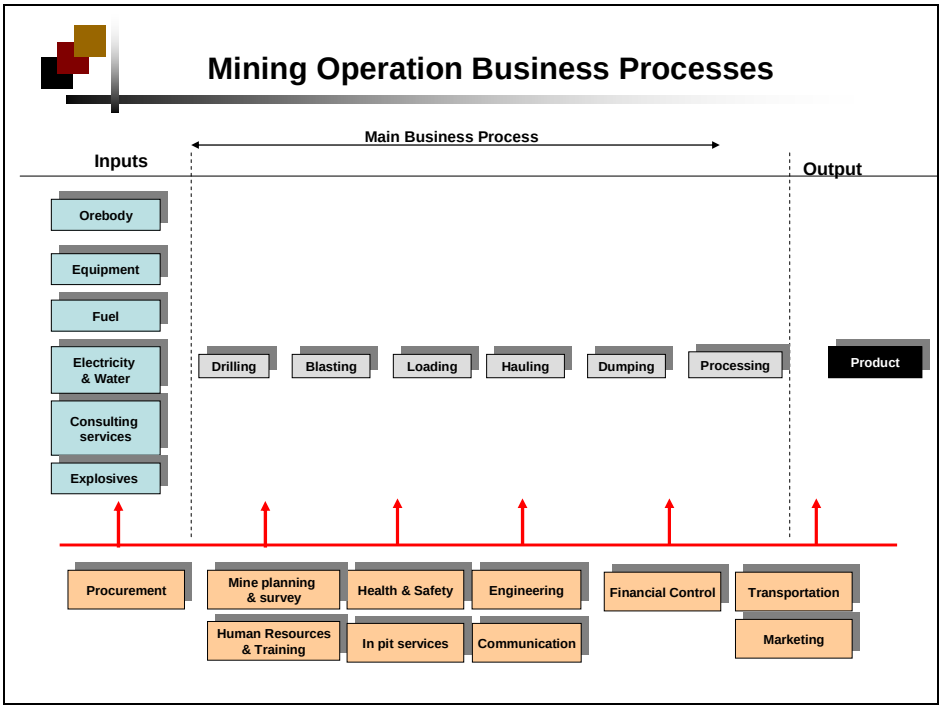


Figure 4.10 Mining operation business processes

Once the business processes are defined, opportunities are determined in a series of brainstorming workshops together with the process owners, who are senior management, sectional management, supervisors and operational staff. The identified opportunities are ranked and action plans are defined together with the owners of the business processes. Supporting any intervention is training and change management. Any game player intent on winning the game is required to understand the process of mine optimisation, particularly where opportunities exist for improvement. This database entails generic

mine optimisation opportunities for improvement that the author has identified on most mine optimisation projects.

Table 4.26 Mine optimisation opportunities

Mine Planning ✓ Accountability of mine planners ✓ Support from mine planning service ✓ Practicality of mine plan	**Drilling** ✓ Drilling room and face availability	**Blasting** ✓ Blast fragmentation to match crusher input requirements ✓ Cost cutting initiatives impact negatively on blasting performance ✓ Coordination of clean faces for blasting ✓ Adherence to mine plan ✓ Time between blasting , duration of stoppage due to blasting
Loading ✓ Mechanical availability and reliability of loaders	**Hauling** ✓ Poor geology resulting in poor road conditions ✓ Balancing of equipment with targets ✓ Lack of ownership and accountability by truck operators ✓ Tracking of driver performance per machine ✓ Roadway spillage and effect on tires ✓ Mismatch of trucks to available excavators	**Dumping** ✓ Bottlenecks at dumping operation due to lack of skills and inexperienced operators
Processing ✓ Communication between mining and processing departments ✓ Mineral inventory management ✓ Recoveries ✓ Interface with engineering ✓ Plant availabilities ✓ Operator skills and ownership ✓ Furnace controls ✓ Waste management ✓ Mineral theft	**Engineering** ✓ Communication between mining and engineering staff ✓ Bureaucratic maintenance systems ✓ Lack of real time information ✓ Long repair times ✓ Scheduling constraints ✓ Prioritization of repair work ✓ Supplier performance ✓ “New parts” fitters ✓ Lack of focus on key ingredients: diesel, water, air, oil ✓ Right tools for the job ✓ Analysis of breakdowns with suppliers	**Financial** ✓ Consultation of operations people in budgeting process ✓ Inconsistent budgeting ✓ In-time financial indicators at operational and management levels ✓ Awareness of costs at operational levels ✓ Need to calculate the return on investment prior to appointing contractors and vendors
Procurement ✓ Cumbersome ordering methods ✓ Relationships with suppliers to reduce costs ✓ Payment terns & conditions ✓ Selection of suppliers ✓ Availability of spares ✓ Skills of buyers		

4.3.6 Database 6: Junior Mining Company Teams [48,49,50,51,52,53, 54,55,56,57,58,59,60 61,62,63,64, 65,67,68]

The people behind junior mining companies are integral to the success of companies. The market places considerable value on the team and the share price of the company is a also a reflection of the team's experience, qualification, integrity and professionalism. An effective team with the necessary qualifications and experience is required to bring the mining asset up the value chain. The purpose of this section is to review the teams of the twenty junior mining companies with the intention of creating benchmarks for the game plan. As before, the Annual Reports available to the public reflecting period 2003-2005, as well as the websites, were analysed.

A statistical analysis was then undertaken, to determine maximum, minimum, average and standard deviation values, as well as values for the top market performers. This analysis provided a detailed comparison of top, medium and poor market performers. The following was analysed:

- Composition of the board of directors
- Management teams of junior mining companies – discipline distribution
- Experience of team members
- Professions of the board of directors

i) Composition Junior Mining Companies Boards

	Chairman	MD/ CEO	Exec Director	Non Exec Director	Fin Dir / Comp Secretary	Sum
Anvil	1	1		3		5
Equinox	1	1	1	1		4
Gallery	1	1		2		4
Resolute	1	1		2	1	5
Aquarius	1	1			1	3
Tiomin		1	5		1	7
Adastra	1	1	4			6
Etruscan	1		4			5
FQM	1	1		1	1	4
Petra	1	1	3	2	1	8
Jubilee	1		2	1	1	5
African Eagle	1	1	1	2	1	6
Kenmare	1	1	1	4	1	8
Randgold	1	1		2	1	5
Thabex	1	1		3		5
Metorex	1	1	3	2		7
DRD	1	1		6		8
Total	**16**	**15**	**24**	**31**	**9**	**95**
Percent	**17%**	**16%**	**25%**	**33%**	**9%**	

Statistical Analysis:	
Maximum	8
Minimum	3
Average	6
Standard Deviation	2
Top Perfomer Average	6

Market Performers

Top Performers
Medium Performers
Poor Performers

Figure 4.11 Composition of the junior mining company boards

On average, there are six board members per junior mining company. Non-executive directors constitute one third (33%) of the boards. Boards have between eight and three members. On average, the top performers have six board members.

ii) Management Teams of Junior Mining Companies – Discipline Distribution

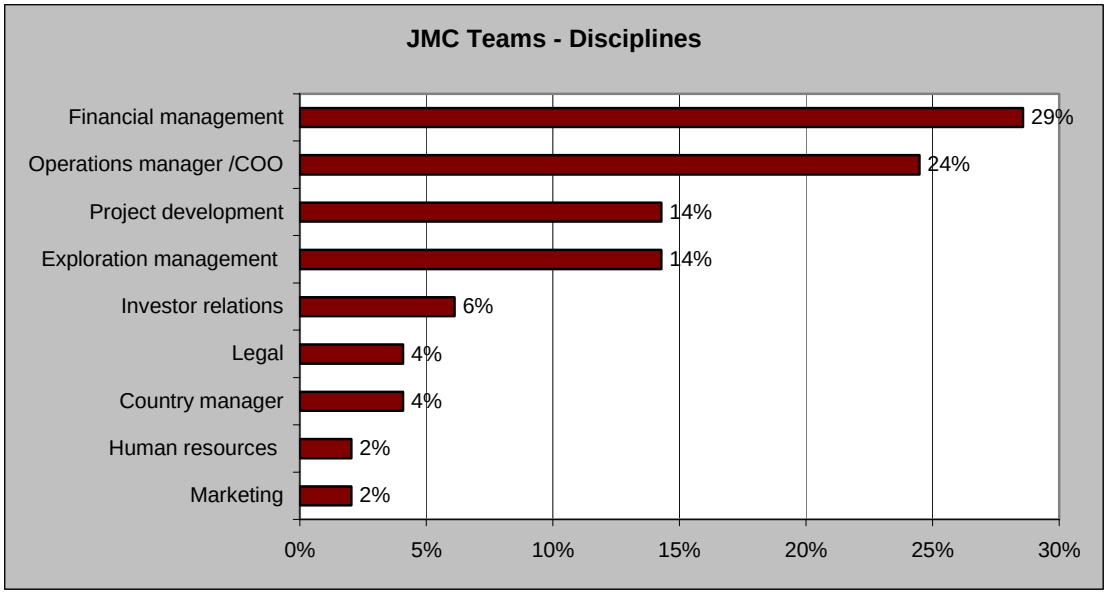


Figure 4.12 Management teams

Figure 4.12 shows that financial management is the largest discipline in junior mining company teams (33%), followed by operations management at 24%. The disciplines of project development and exploration management each constitute 14% of the teams. Investor relations, legal and country management constitute between 6 and 4% of the teams.

iii) Experience of Team Members

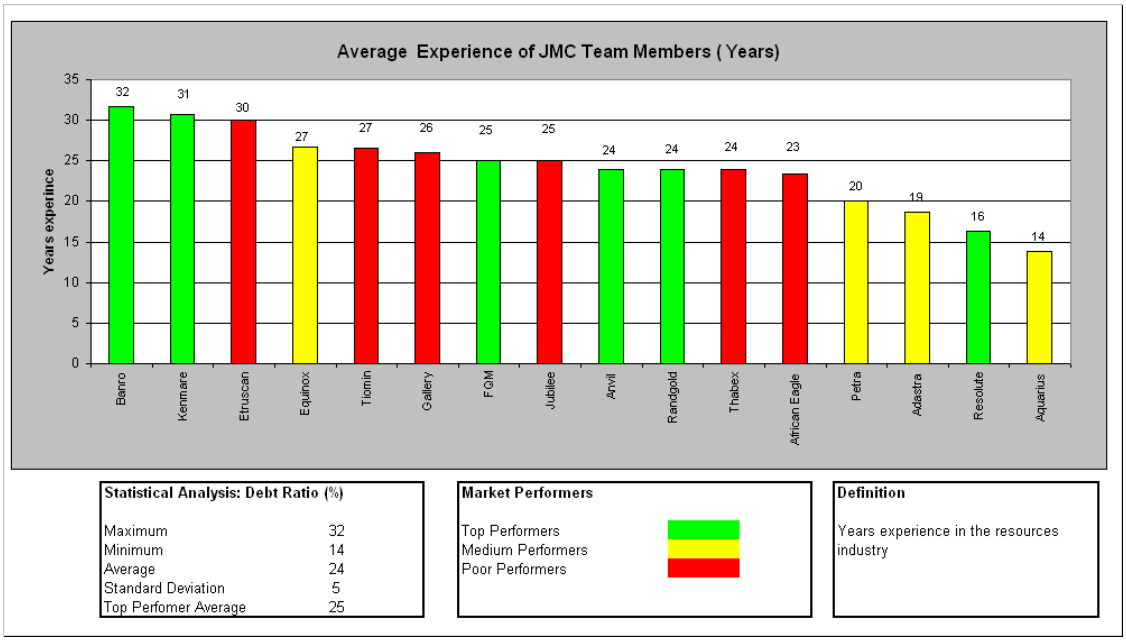


Figure 4.13. Average experience per team members

The average experience of junior mining company team members is extensive at 24 years, implying that the average board member is in his or her late forties. One can assume that over this period members of the team have acquired extensive experience in operations management, mine development, exploration, law and financing. However, the team members of some JMC companies, such as Aquarius, Resolute and Adastra have below 20 years' experience. On average, members of the top performing companies have industry experience of 25 years.

4.3.7 Database 7: Team Management

In the description of the Business Investment Triangle, Robert Kiyasaki [37] referred to business to being a team sport. In the business of junior mining, the team comprises different types of people with different skills and cultures coming together to work in a junior mining company. The team entails entrepreneurs, geologists, mining engineers, metallurgists, promoters, financial and legal experts, investors, key operational staff, back office administrative staff, mine planners, field geologists, consultants, contractors and suppliers and government officials. Cultures can be diverse. Randgold Resources is mentioned as an example of diversity, with investors being Anglosaxon, the board being multinational, the operations management team being South African and the on-site management and operators being West African [62,80]. Strong leadership is required in the risky business of mining, where large amounts of capital are required and team work is integral to success.

The game player of the junior mining game has to bring out the best in people to make the junior mining venture a success, because without motivated people the venture will fail. He has to understand that there are different types of personalities. People have different strengths, weaknesses and their needs have to be satisfied in order to achieve the results required to win the game. The game player also needs to be aware of the key questions that need to be addressed in order to have motivated employees and staff.

Working for a junior mining company is different to working for a well-established major mining house. There is less guarantee of long term continuity and stability; there are less fringe benefits such as those provided by well-established major miners, working hours are longer, traveling to remote places is tougher, there is a continuous focus on keeping costs to a minimum, and growth is dependant on the capability to attract investment.

To motivate people other than shareholders to work in this environment, monetary compensation needs to be above-average and people in the team need to feel appreciated, respected and participate in the upside. The purpose of this database is to present key

concepts to the player that the author has researched and experienced and which he believes will enhance the chances of developing a winning team.

Scott [84] presented four personality types according to which people can be classified. Each person is made up of one dominant and one subdominant personality type. Each type has different characteristics, strengths, weaknesses and needs. The key for the game player here is to identify the personality types of his team, play on the strengths, assist with the weaknesses and ensure the needs are addressed in order to develop a winning team that will contribute significantly to the ultimate goal of winning the game.

Table 4.27 Team management

Lion	**Otter**	**Golden Retriever**	**Beaver**
Leader, boss, bottom-line orientated, observer, not listener Loves to solve problems Likes to seek new adventures Very low threshold for boredom Focusses on now instead of on distant future	Party waiting to happen, excitable, fun loving, cheerleader type, people orientated Concerned about popularity rather than achieving tangible results Desires prestige, flashy, attentive to style Wants to share ideas verbally Lots of wrong calls because goes with feelings, not facts Has to have approval	Loyal, spends time helping others & building relationships, can absorb most emotional pain & punishment from relationships & remains committed to relationships, great listener, empathetic Focusses on present Fears change, likes status quo	Perfectionist – where exact science Accountants, attorneys, engineers, architects, mathematicians Strong need to do things right, by the book Great for quality control NB: rules, consistency, standards, frustrated with others who don't share same characteristics
Needs			
Results, variety, new challenges, freedom, authority, opportunity for advancement	Social activities, activities that are fun, free from detailed work, approval	Security, gradual change & time to adjust, environment free from conflict, quality relationships, security, own area/space, relaxed, friendly environment	Clearly defined tasks, stability, security, gradual change, low risks, tasks requiring precision & planning

4.3.8 Database 8: Risks identified for Mining Projects

Database 8 contains risks identified for mining projects, which will be utilised for the risk management pillar. The author is drawing on his MSc dissertation: "Identifying, quantifying and simulating risks for Greenfield mining projects in sub-Saharan Africa"[(85)].

The specific risks which these mining projects are likely to encounter were identified from research into the current status of mining in sub-Saharan Africa, criteria for the investing mining company, current projects in sub-Saharan Africa and the status of the countries in Africa in which these projects were undertaken. Risks are classified into technical, economic and human categories.

Table 4.28 Technical risks

Risk 1: The geology does not materialise according to the studies: ✓ Despite covering the mining area with a geological grid, complete knowledge of the orebody is only obtained when the orebody is mined. ✓ Dykes and faults might not have been intersected and/or were not accounted for or grades could have been overestimated.	**Risk 2: Wrong selection of mining method:** ✓ The mining method selected is not suitable for the site-specific conditions. ✓ The availability of the equipment is poor and production targets are not met. ✓ The mine will have to invest further capital to employ additional mining equipment or change to a new mining method.
Risk 3: Environmental risk: ✓ This risk includes the risks inherent in rehabilitation, waste disposal and changing international environmental legislation. ✓ Poor rehabilitation implies that it is difficult to rehabilitate the mined-out areas and poor rehabilitation results are obtained. ✓ The risk of slimes dam failure due to floods or poor construction would threaten the surrounding environment with severe consequences for all parties involved. ✓ Changes in environmental legislation can force mining companies to allocate a greater amount of resources than budgeted for into the rehabilitation fund. ✓	**Risk 4. Poor yields:** ✓ The yield of a product is a function of the geology of the orebody, the method of mining and the beneficiation process. ✓ The mining operation will try to achieve a yield as high as practically possible, as a greater yield means more final product. ✓ This risk implies that, despite efforts, the mining company fails to achieve yields as forecast.
Risk 5: Equipment failure: ✓ This risk implies that the mining or beneficiation equipment selected fails due to site-specific conditions. ✓ Production will come to a standstill or decrease markedly and the mine will have to invest in alternative equipment or replace existing equipment more frequently than planned.	**Risk 6: Infrastructure failure**: ✓ Mine infrastructure incorporates water, electricity, civil and transportation infrastructure. ✓ A failure of water supply will bring the beneficiation process to a standstill. ✓ In the event of a power shortage, emergency gensets are brought into operation. ✓ A breakdown of the transport infrastructure in the host country or neighbouring countries means that there is no, or a marked decrease in the flow of

	materials, spares, commodities and manpower from and to the mine.
Risk 7: Cost and availability of electricity and water: ✓ New mining projects will be in increasingly remote areas as the orebodies close to civilisation are close to exhaustion. ✓ Water is a scarce commodity and the mine will have to compete with the local population for water or provide its own. ✓ In remote areas the mine will have to provide its own electricity by diesel-powered gensets. ✓ Water and electricity have the potential of increasing the operating expenditure dramatically over the life of mine.	

Table 4.29 Economic risks

Risk 8: Mining company forced to use government services even if not competitive. ✓ With an equity share in the project, the host government or its local representatives could insist that the mining company use government services in one or more areas, such as mining, beneficiation, water or electricity. ✓ These services could be of a poor, non-competitive standard as they have been subject to years of neglect, corruption and non-maintenance.	**Risk 9: New entrants into market:** ✓ A large number of projects are in a feasibility stage and should come into production within the next five years. ✓ This could result in a greater supply of commodities and in turn to a downward pressure on commodity prices.
Risk 10: Incorrect market-forecast: ✓ The market-forecast projects the supply and demand for the commodity over a certain time period. ✓ An incorrect market forecast can have a severe impact on the profitability of a project, as revenues forecasted are not materialising. ✓ If the actual commodity market deviates slightly from the forecast, the mining company will have to take cost-cutting measures to maintain the profit margin. ✓ This risk covers depreciating commodity prices, as a result of depressions in global economies. ✓ Currently this risk is not present, but it may realise unexpectedly.	**Risk 11: Insufficient capital / underestimation of costs:** ✓ The projected capital expenditure for a mine development project could be insufficient because the mining company is experiencing a shortage of cash-flow, has commitments in other projects or the economy of scale have increased the capital requirements of the project beyond the capabilities of the mining company.
✓ **Risk 12: Change in tax regime:** Most resource-based countries have moved towards investor-friendly policies. ✓ African countries have to provide attractive fiscal regimes, to compensate for higher operating costs, higher perceived or actual country risks and lower levels of infrastructure. ✓ However, at the same time, many host governments are pressurised to socially uplift their impoverished societies. ✓ With mining projects as their only source of foreign exchange, it is possible that the host government will increase taxes.	**Risk 13: Underestimation of operating costs:** ✓ Operating costs could have been underestimated because more expensive mining methods need to applied, the mining company did not foresee a shortage of services, compensation for land claims was higher than expected, the cost of transportation underestimated or the host government required payments for social upliftment or administrative costs which were not budgeted for.

Risk 14: Cannot obtain finance: ✓ Mining companies are funded by a combination of debt and equity. Merchant banks finance the debt portion, while the equity portion is usually shared by a consortium of mining companies. ✓ Alternatively, money is raised on the stock exchange. ✓ A decrease in commodity prices, a financial crisis, political turmoil in Africa and mining scandals, such as the Bre-X scandal can suddenly decrease investor confidence in mining projects. Should finance not be obtained, the project will come to a halt; it will be postponed, abandoned or sold.	**Risk 15: Decreasing control in project management:** ✓ At the beginning of a project, the mining company undertaking the feasibility study will have certain expectations of shareholding in the project. ✓ However, circumstances can change in the period leading up to commissioning. ✓ The cash-flow liquidity of the company can decrease, exchange rates can be more unfavourable for the mining company or the host governments may demand a greater share in the project. ✓ This can force the mining company to accept a smaller shareholding in the project and decrease its control over the management of the project.
✓ **Risk 16: Delay in production start-up:** ✓ This risk implies a delay in production start-up attributed to delay in obtaining permits, land claim and political uncertainty. ✓ A delay in production start-up means that the project will be able to take less advantage of the upswing in commodity prices and move into the downward swing sooner than expected.	

Table 4.30 Human risks

Risk 17: Host government does not honour agreement: ✓ A mining venture will proceed only after an agreement has been reached between the host government and the investing mining company. ✓ There is a risk that the host government may default on one or more of the above agreements. Political turmoil, a change of leadership, social pressures or civil war can lead to this.	**Risk 18: Political instability:** ✓ Political instability is a major threat to mining projects, as the mining company may have to operate under a different investment environment than projected. ✓ This risk implies either civil war, acts of terrorism by rebel forces, violent change of political leadership, the change to a socialist system from a free market system and nationalisation or expropriation of a mine.
Risk 19: Threat to health and safety of employees: ✓ Mines in developing African countries are staffed by expatriates in key managerial and skilled staff positions. ✓ Risks include exposure to armed rebel forces or acts of terrorism in the wake of political turmoil or contracting malaria or AIDS. ✓	**Risk 20: Delay in obtaining leases, permits and mining rights.** ✓ The licenses required prior to the commencement of mining differ from country to country. However, the general sequence is as follows: ✓ Prospecting right, mineral lease, mining right and mining authorisation. ✓ Delays in obtaining the licenses can occur because of bureaucratic systems, corruption, resettlement issues and disputes over land use.
Risk 21: Land claims ✓ The mining company will have to compensate people located in the mining path who have to be removed. ✓ Disagreement over compensation can impact negatively on the project. ✓ Public pressure by support groups in industrialised countries can cause the project to fall into disrepute. ✓ Land claims by indigenous people might force the mining company to pay more than budgeted for compensation, delay the project or even abandon it.	

Risk 22: Unstable, unionised labour force: ✓ Mining companies need to convince the local community of the benefits of the mining project. ✓ There is a possibility that the local community population will revolt against the mining company, if its expectations are not met. ✓ This can manifest itself in strikes and sabotage.	**Risk 23: Low availability of skilled, competent labourers:** ✓ The availability of skills varies from country to country. ✓ Regions, in which mining took place during the colonial rule will have skills the investing mining company requires. ✓ Additional expenses will be incurred to train the local population and to employ expatriates. .
Risk 24: Mining company cannot adapt to cultural diversity: ✓ New mining ventures in Africa are undertaken by mining companies which are located in industrialised, western countries. ✓ The venues of the projects are situated in poor, developing African countries whose culture is diametrically opposite to that of the investing mining company. ✓ Should the company not be able to adapt to the different cultures, there is the potential for conflict, which can ultimately affect the productivity of the mine.	**Risk 25: Lack of project performance from the state:** ✓ The host government is a partner in the mining project. ✓ Despite legal agreements, the host government, in the form of a state mining company, government departments, provision of water and electricity and the provision of infrastructure may not perform as expected by the investing mining company.
Risk 26: Lack of consensus between joint venture partners: ✓ Many projects are operated by a consortium. ✓ As the joint venture partners come from differing backgrounds, different company cultures and have different areas of expertise, the possibility of conflict is real. ✓ The conflict can have little to far-reaching impacts for the project.	**Risk 27: Importation restrictions:** ✓ In order to run the mining operation efficiently and cost-effectively, the mining company will need to import modern mining and beneficiation equipment. ✓ It is possible though, that the host government will restrict the import of the equipment in an effort to compel the mining company to buy equipment existing in the country.

4.3.9 Database 9: Corporate Sustainability

The corporate sustainability database entails a review of corporate governance practices, community development initiatives and environmental management approaches of selected junior mining companies. Corporate sustainability has become a key strategic issue for mining companies in the last decade. Junior mining companies need to prove to investors in wealthy economies that they are responsible corporate citizens.

i) Corporate Governance [86]

Resolute presented the most comprehensive corporate governance approach in their Annual Report to shareholders, which is well-suited for the game plan database.

Board Responsibilities: Resolute has outlined the board's responsibilities as follows: appointments and evaluation of members of the board, development of corporate strategy, approval of investments and new plans, oversight of the management of business risks, safety and occupational health, making certain that the financial position is adequately set out, ensuring that the company acts legally and responsibly, and communications to shareholders.

Board Composition: The board composition of junior mining companies usually entails a non-executive chairman, an active CEO and 2 – 6 non-executive directors.

Directors Independence: Independent directors are not deemed to be a substantial shareholder; must have been employed in an executive capacity in the company within the last 3 years, may not be a professional advisor or a material supplier and be free from any interest or business that could materially interfere with the director's ability to act in the best interests of the company.

Audit Committee: This committee ensures that an internal control framework exists within the company to oversee the work of the auditor, review and pre-approve financial

statements, review the effectiveness of internal control environment, and appoint senior financial executives.

Remuneration and Nomination Committee: This committee determines and reviews compensation for the Board of Directors and the management team.

Safety, Security and Occupational Health Committee: This committee oversees employee education programmes designed to increase awareness of safety and health issues, monitors safety statistics, and reports results of incident investigations.

Risk assessment and management: The function entails the identification and assessment of areas of significant strategic, business and operations risk.

Environmental and Safety management: This function entails establishing environmental and safety policies, overseeing compliance with applicable environmental and safety laws, reviewing operational activities to ensure compliance, minimizing environmental effects, encouraging contractors to comply with environmental policy, overseeing employee education programmes designed to increase awareness of safety and health issues, and providing a framework to ensure employees meet environmental responsibilities.

Shareholder Communication: The Board of Directors needs to ensure that shareholders are kept informed of all information necessary in a timely manner via annual and quarterly reports and announcements.

Ethical Standards: The need for highest standards of corporate governance and ethical conduct is required by directors, the management team and employees**.**

Securities trading: Once the junior is listed, it is illegal for directors and employees who have price sensitive information which has not been published, to buy, sell, deal in company shares or encourage family members to do so.

ii) Community Development

Mining companies affect the communities in which they operate. In order to secure funding and demonstrate sustainability for its mining assets in a mining community, the companies need to demonstrate to the mainly western investment community how the negative impacts of exploration, mine development and mining are counterbalanced by positive spin-offs for the community. Selected community investment projects by the twenty selected junior mining companies are presented below:

Table 4.31 Community development projects

Anvil Mining [48] ➢ Implementation of a community health program to reduce incidents of Malaria by 30% at the Dikulushi Mine ➢ Financing of the Dikulushi School ($75,000), the Lumakete School ($30,000) and the Kilwa Hospital ($175,000).	**Gallery Gold** [50] ➢ The A$44,000 sponsorship of Francistown's SOS children's village.
Resolute [51] ➢ The provision of a water supply system to the town of Nzega. ➢ Renovation of schools, training of farmers, introduction of voluntary teachers and a doctor from Australia to the project. ➢ Projects emphasize technology transfer and capacity building. ➢ The company has spent A$1 mill in community development projects.	**Aquarius** [52] ✓ Provision of Adult Basic Education and Training (ABET) programs at the mines. ✓ Securing water supplies to a local primary school ✓ Implementation of a day care facility and nutritional feeding schemes.
Randgold Resources [62] ✓ At communities surrounding the Morila operation, a community development trust fund to the value of $500,000 has been establishment. ✓ In addition, HIV/AIDS and mosquito control campaigns have been undertaken, water wells and pumps have been provided to villages surrounding the mining projects and villagers have benefited from medical treatment and medical evacuations by air.	**Etruscan** [56] ✓ Etruscan's corporate philosophy is that natural resources belong to the people of developing countries in which it works. The company should conduct itself as "guest" in these "host countries". ✓ In Niger, a medical clinic offering primary healthcare service to a rural population of 15,000 has been established in partnership with State of Niger, Rotary International, Health Partners International and others. ✓ In South Africa, projects included a computer laboratory, an Internet Café, a training centre, an adult education program and agricultural initiatives that transfer knowledge in farming methods and equipment maintenance have been implemented.

iii) Environmental Management

Environmental management entails establishing environmental policies, overseeing compliance with applicable environmental laws, working with government/authorities to develop effective, efficient measures to minimize environmental effect, encouraging contractors to comply with environmental policy and providing an organizational framework that enables employees to understand and meet environmental responsibilities. Below is presented key environmental management activities of selected junior miners:

Table 4.32 Environmental management

Gallery Gold (50) ✓ Working with the Botswana national museum on a cooperative basis to make sure that archeological sites in the lease area would not be disturbed by mining. ✓ Introduction of a cyanide management system which complies with Gold Council of Australia guidelines. ✓ Rehabilitation trials.	**Resolute** (51) ✓ 70ha programmed for rehabilitation ✓ Reforestation of community land. 250,000 seedlings of 32 native tree species propagated in nurseries.
Aquarius (52) ✓ Clean-up of old dumps on the mine property.	**Adastra** (54) ✓ Liaison with interested and affected parties on environmental impact issues. Co-operation with local NGO's and governmental and tribal authorities
Kenmare Resources (61) ✓ Preparation of an environmental management plan for the Kenmare project to World Bank standards. ✓ Working closely with the Government of Mozambique and local communities to ensure the development of the Moma Mine will meet the country's environmental standards.	

4.4 Summary

This Chapter has focused on developing databases for the game plan for purposes of creating references and benchmarks for the player playing the game of junior mining. Databases have been created from the analysis of twenty junior mining companies, practical experiences gained through the author's experiences in mine optimization, as well his MSc Eng dissertation. The following databases have been created:

- ✓ Strategies of junior mining companies
- ✓ Junior mining company teams
- ✓ Deal structures
- ✓ Junior mining company financial performance
- ✓ Operations management systems
- ✓ Mine optimization
- ✓ Mining project risks
- ✓ Corporate sustainability

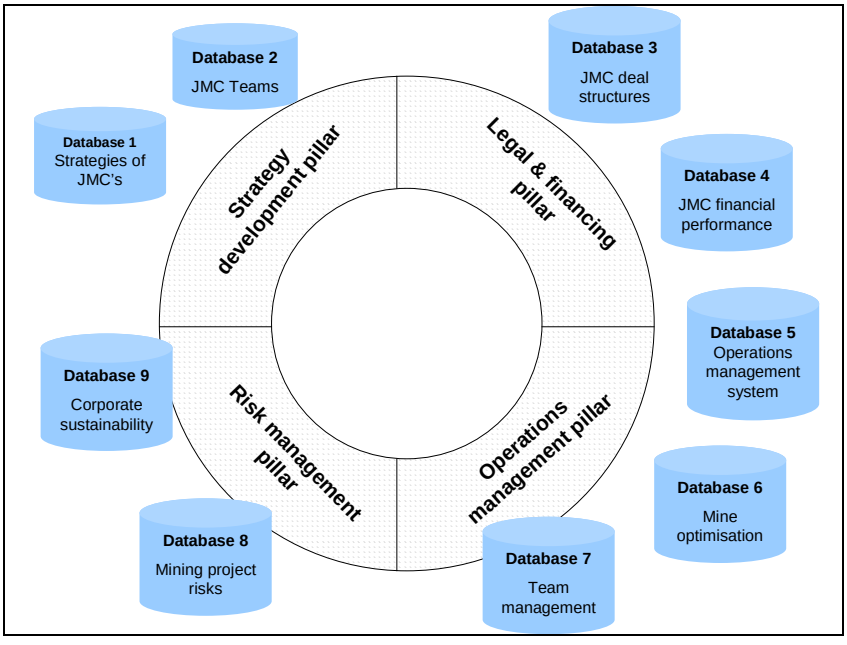


Figure 4.14 Gameplan databases

Database 1: Strategies of junior mining companies: The strategies of market winning companies First Quantum, Banro, Kenmare, Randgold Resources, Metorex, Resolute and Anvil Mining are diverse and range from:

- ✓ Expansion in the Copperbelt : First Quantum
- ✓ Acquiring mines that are unsuitable for major miners: First Quantum
- ✓ Developing a significant resource base in the DRC: Banro
- ✓ Focusing solely on the successful execution of one project: Kenmare
- ✓ Creating an active pipeline across the entire mine project value chain: Randgold Resources
- ✓ Decentralized management of diverse assets, with rigid cost control and operational leanness: Metorex
- ✓ Disposal of non core asset and using proceeds to acquire a new mine: Resolute
- ✓ Staged development, using Cashflow to finance new ventures: Anvil

Database 2: Junior mining company deal structures: Deal structures can be simple as well as highly complicated. Constituents of a mining deal are the company, the mining asset, partners, the host government and the financier. Often, there are several companies between the mining company claiming the asset and the physical asset, with complex cross shareholding. The presence of major mining companies is to be found in deals, as these are often the companies selling the asset to the junior.

Database 3: Financial performance of junior mining companies: On average, junior mining companies are loss makers. It can be concluded that the game is mainly about capital appreciation rather than profitability. However, a profitable operation is required if one wants to be a market winner. The average debt ratio is 32%, implying that juniors mainly rely on equity financing. On average the companies have financial reserves of $ 20 mill available to them, but some players in the game manage to exist with no financial reserves available. The price earnings ratios vary massively from 73 to – 52, the average of the top performers being 23.

Database 4: Operations management: The player of the game needs a management system to maximize the performance of the mining asset through effective measurement. This is done through the Operations Management System, which is a system integrating forecasting, planning and scheduling, execution and reporting on the mine of the key aspects of safety, mining, engineering, processing, manpower and controllable costs.

Database 5: Mine optimization: Once an effective measurement system is in place, the game player needs to focus on the optimization of business processes in order to maximize the profitability of the mining asset. Typical mine optimization opportunities have been presented for the mining, processing, engineering, financial, procurement and human resources functions. These are applicable to any mining operation.

Database 6: Junior mining company teams: The team analysis reviewed the board composition of top junior mine companies. On average there are six board members. Financial management constitutes the biggest discipline in teams, in an environment where engineers and financial managers form the bulk of the professionals. The average industry experience per team member is 24 years.

Database 7: Team management: Team management is about providing leadership, bringing out the best in people, working with different personality types and creating an attractive workplace environment. These issues have been dealt with in the context of the high risk game of junior mining.

Database 8: Risks identified for mining projects: Research has been done into risks that mining projects are likely to encounter and which need to be managed. The following generic risks have been identified, and classified into technical, economic and human categories:

Table 4.33 Summary of risks identified for mining projects

Technical risks:	Economic risks:	Human risks
✓ The geology does not materialise according to the studies ✓ Geological data and record losses / unavailability ✓ Wrong selection of mining method ✓ Environmental risk ✓ Poor yields ✓ Equipment failure ✓ Infrastructure failure	✓ Cost and availability of electricity and water ✓ Mining company forced to use government services even if not competitive. ✓ New entrants into market ✓ Unsaleability of product ✓ Incorrect market-forecast ✓ Insufficient capital / underestimation of costs ✓ Decreasing commodity prices ✓ Change in tax regime ✓ Cannot obtain finance ✓ Decreasing control in project management ✓ Delay in production start-up	✓ Host government does not honour agreement ✓ Political instability ✓ Threat to health and safety of employees ✓ Delay in obtaining leases, permits and mining rights ✓ Land claims ✓ Unstable, unionised labour force ✓ Low availability of skilled, competent labourers ✓ Mining company cannot adapt to cultural diversity ✓ Non-performance of contractors ✓ Lack of project performance from the state ✓ Lack of consensus between joint venture partners ✓ Importation restrictions

Database 9: Corporate sustainability: Corporate sustainability is the review of optimal corporate governance practices, community development projects and environmental management of selected junior mining companies. This is integral to a junior's strategy and risk management plan, as investors in wealthy countries, from whom the game players seek equity capital, require a responsible, sustainable corporate citizen.

CHAPTER 5. PLAYING THE GAME – COAL JUNIOR MINING COMPANY

5.1 Introduction

This chapter of the thesis entails playing the game of junior mining. It is an integration of the game plan design which draws on the databases developed and caters for the dynamics of the resources industry. For each game plan pillar, simple game plan models and matrices will be introduced and used. In this chapter the game plan will be executed using the case study of the hypothetical junior mining company, Energy-X Resources (EXR). EXR has a medium-sized coal mining operation, a feasibility study and two exploration projects and is intent on listing on a foreign stock exchange in order to raise equity capital and raise its profile for further acquisitions.

The game will be played along the following lines:

Table 5.1 Playing the game for EXR

The foundation – rules of the game:	A recap of the applicable foundation elements pertaining to coal junior mining.
The player:	A description of the EXR in terms of a corporate overview, an overview of the mining assets, the team and financial statistics.
The mining asset:	A detailed description of the mining assets of the EXR along the project value chain. Under review are the geology and exploration, mining, processing, infrastructure, logistics and suppliers, marketing, human resources, and economic evaluation of the mining asset and a summary of the operations risks.
Playing the game plan pillars:	Step-by-step, the strategic, legal and financial, operations management and risk management pillars are executed for the EXR. This forms the bulk of the game plan. Extensive use is made of simple models and matrices, which are generic and can be applied to any junior mining company in any commodity. Throughout this process, relevant data is drawn from the developed databases, in order to ensure that the game plan is modelled closely to that of top junior mining companies.
Scoring the game:	Finally, the EXR game plan is scored, using the score matrix developed. The company will be rated as an investment opportunity and its winning potential assessed. Shortcomings will be highlighted which need to be addressed in order to increase the global competitiveness of the company.

5.2 Foundation – Rules of the Game

The foundation represents the unique rules and constraints pertaining to the mining industry, company management and financial performance analysis, as defined in Chapter 3.2.

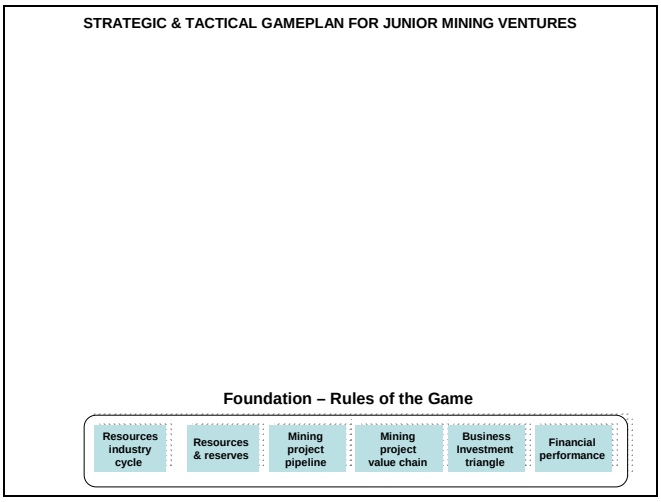


Figure 5.1 Foundation

The foundational elements hold as follows for the coal sector:

Matrix: The foundation

#	Foundation	Coal sector
1	**Resources industry cycle**	The coal mining sector is, like other mining ventures, positioned at 10 o'clock on the resources industry cycle, defined by rising exploration, establishment of smaller junior BEE coal mining companies, and mining skills leaving big companies to join smaller entrepreneurial companies.
2	**Resources and reserves**	The principles of resources and reserves apply to the coal mining sector.
3	**Mining project value chain**	The mining project value chain is applicable to the coal sector: the sequence of the development of the coal mining asset follows along the line of exploration, feasibility study, mine development and production.
4	**Mining project pipeline**	The project pipeline holds for the coal sector, with many hundred geological coal anomalies leading to a select amount of coal exploration projects and a selected few leading to coal mining feasibility projects and only the most attractive feasibility leading to becoming an operational coal mine.
5	**Business investment triangle**	The elements of the business investment triangle are applicable to the coal mining business. The product is coal, but like any company, EXR needs a mission, cashflow, communication, systems, legal contracts, a functioning team and leadership. The final product at the top of the triangle is coal produced by a mine, a mining feasibility study ready for execution or an attractive coal exploration project.

6	**Financial performance**	EXR's financial performance will be ultimately measured by its financial statement, i.e. income statement and balance sheet. EXR is a player of the highly speculative junior mining market and intent on listing. Once listed, EXR's share price movement will be a key measurement for investors, as it represents the market perception of the company.

Summary: the foundation – EXR

The foundational elements as defined in Chapter 3.2 are applicable to coal mining. A junior coal mining company is currently positioned at 10 o'clock on the resources industry cycle. The concepts of resources and reserves, mining project value chain, mining project pipeline apply to the coal mining sector. A coal junior mining venture is a business like any other and the principles of the business investment triangle and financial performance measurement hold.

5.3 The Player – Energy-X Resources (EXR)

The player of the game is Energy X Resources.

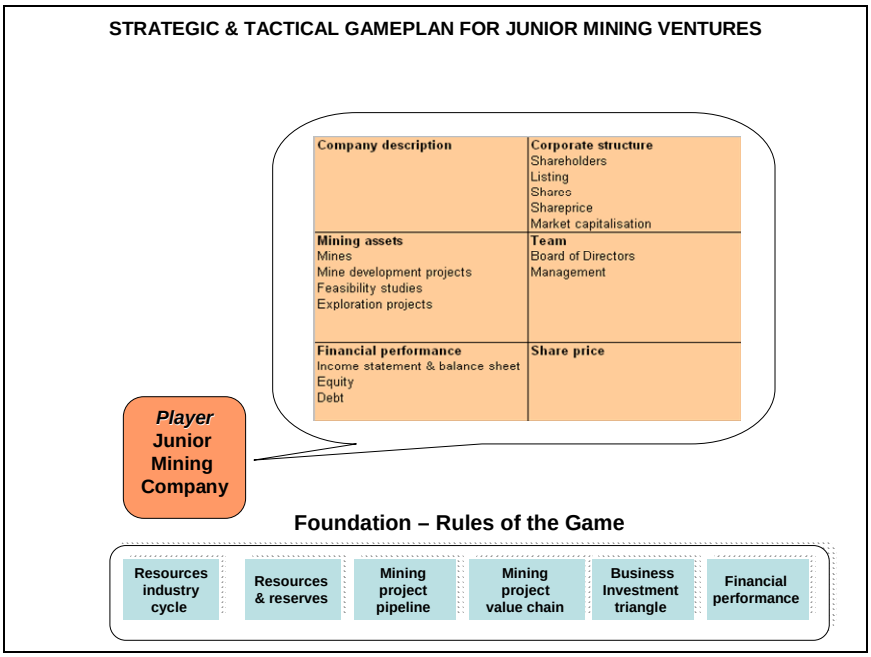


Figure 5.2 Defining the game player

The player is defined by:

- ✓ **A company description**
- ✓ **The corporate structure**: shareholders, listing details, shares issued and authorised, the share price and market capitalisation.
- ✓ **A summary of the mining assets**: an overview of the portfolio of the company.
- ✓ **The team:** a summary of the team comprising the board of directors and the management team.
- ✓ **A financial performance summary:** a snapshot of the income statement and balance sheet, equity financing and debt financing activities.
- ✓ **The share price:** A review of the share price over a three year period, should the company be listed on a stock exchange.

Matrix: The player

Company Description

- ✓ The EXR is a junior coal mining company, focussed on the exploration, development and operation of coal mining ventures in sub-Saharan Africa.
- ✓ The mining assets of the EXR are the Highveld Mine, the Ermelo Project (feasibility study) and exploration concessions in Mozambique.
- ✓ The company is intent on listing on an offshore mining stock exchange in order to access capital for its projects and grow to a mid-tier coal mining company.
- ✓ The company is 4 years old.
- ✓ In year 1, it acquired the Highveld Mine from a major coal mining company. The mine is a marginal producer of bituminous coal for the Eskom coal market.
- ✓ In year 3, it secured the option to purchase the Ermelo Project from a major mining company, undertook a drilling campaign and commenced with the feasibility study.
- ✓ In year 4, the company secured exploration concessions in Mozambique.

Corporate Structure

Shareholders:

- ✓ Investment Company 1: 30%
- ✓ Investment Company 2: 40%
- ✓ BEE shareholder: 26%

Listing: EXR is not listed yet

Shares

- ✓ Issued shares: 50 mill
- ✓ Fully diluted: 100 mill

Share price: R 0.50/ share

Market Cap: R 25 mill

Mining Assets

Mines

- ➢ Highveld Mine: open pit mine, 1 Mtpa ROM, in-house mining, stage 1 crushing, screening and washing. Product: single stage washed product for local power consumption. Resource 20 Mt, reserve 10 Mt

Mine development projects

- ➢ No projects

Feasibility studies

- ➢ Ermelo Project: Planning of an underground coal mine producing 1 Mtpa of steam coal for the export and inland markets. Resource: 80 Mt, capex R112 mill.

Exploration projects

- ➢ 3 Exploration projects in Mozambique in the Tete coal province, located in close proximity to a highly publicised mega-mining project.

Team (qualification, years experience)

Board of Directors

- ✓ Non executive Chairman: BSc Eng Mining, 35 years
- ✓ CEO: BSc Eng Mining, 20 years
- ✓ Financial Director : Chartered Accountant, 15 years
- ✓ Non executive director: Lawyer, 30 years

Management:

- ✓ CEO
- ✓ Vice President Projects: BSc Geology, 20 years
- ✓ Mine Manager : Diploma Mining, 30 years

Financial Performance

Income statement ($ mill	year 2	year 1
Revenue	15.7	12.9
Cost of sales	15.0	12.4
Gross profit	**0.7**	**0.4**
Net profit before tax	**1.0**	**0.2**
Profit/loss for year	**1.2**	**0.1**
Earnings per share ($)	0.01	

	Shareprice* $	0.13
Balance sheet ($ mill)	year 2	year 1
Current assets	1.4	0.7
Non current assets	5.7	5.0
Total assets	**7.1**	**5.7**
Current liabilities	1.4	1.3
Non current liabilities	4.3	2.9
Total liabilities	**5.7**	**4.1**
Total equity	**1.4**	**1.6**

Cashflows ($ mill)	year 2	year 1
From operating activities	0.7	0.4
From investing activities	-5.7	-5.6
From financing activities	4.3	4.0
Cash at year end	-0.4	0.0

Ratios	year 2	year 1
Gross profit margin	5%	3%
Current ratio	1.0	0.6
Debt ratio	80%	73%
PE ratio	11	

* anticipated shareprice at listing

Share price

EXR is not listed yet

Capital raising

Equity Financing

Date	Activity	# shares	Issue Price	$
Year 1	Issuing of shares for working capital and feasibility study	1 mill	R5/share	R 5 mill
Year 3	Issuing of shares for working capital and feasibility study	6 mill	R10/share	R 60 mill

Debt Financing

Date	Loan	Institution	Interest	Terms
2005	R30 mill	Bank 1	Prime minus 1%	4 year term Guarantees Pledge over proceeds received from sales

Summary: the player – EXR

EXR represents a typical new BEE coal junior mining company in South Africa. It has a marginal coal operation, is targeting coal assets that are typical of those in the South African coal fields and has a speculative exploration play in Mozambique. The company has a strong technical management team with practical industry experience. The company started with an equity injection of R5 mill by a group of entrepreneurs in year 1.

5.4 The Mining Assets of EXR

EXR has three mining assets: the Highveld Coal Mine, the Ermelo Feasibility Study and the Mozambique Exploration Project.

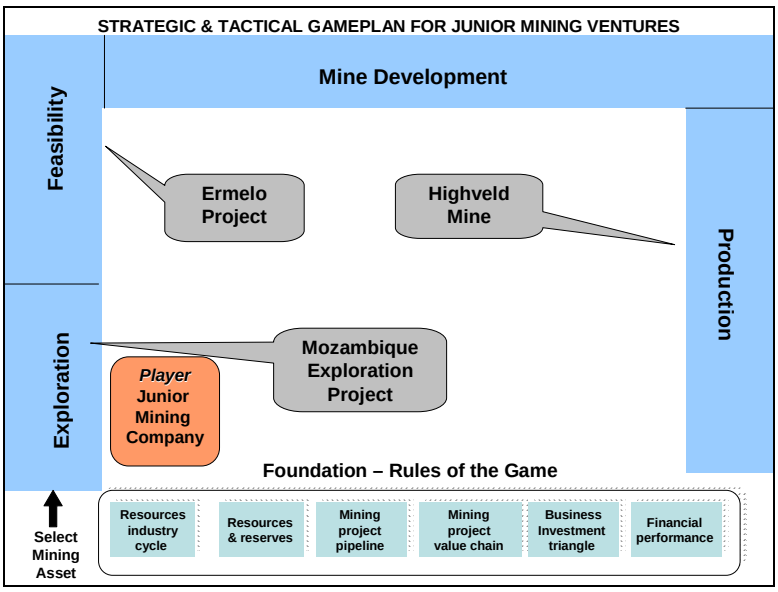


Figure 5.3 EXR mining asset portfolio

Mines, mine development projects and feasibilities are described as follows:

- ✓ Operations description: a brief overview of the mining asset
- ✓ Host country: location of the asset
- ✓ Legal: percentage ownership of the mining asset
- ✓ Geology and exploration: an overview of the geological setting, coal qualities
- ✓ Resources and reserves: a summary of the resources and reserves in million tons
- ✓ Mining: method of mining, life of mine, mining factors
- ✓ Equipment: an overview of the mining equipment
- ✓ Processing: the processing methodology
- ✓ Production: annual production rates
- ✓ Infrastructure: an assessment of the infrastructure status near the mine
- ✓ Logistics and suppliers: key issues pertaining to logistics
- ✓ Marketing: off take agreement, price per ton sold
- ✓ Human resources: number of employees and contractors
- ✓ Environmental and social: key environmental and social projects on the mine
- ✓ Financial: capital and operating costs, project NPV and IRR
- ✓ Operations Risk: key operational risks identified

.

Exploration projects are described as follows:

- ✓ Project Description: a description of the exploration project
- ✓ Project Stage: early or advanced stage exploration
- ✓ Host Country / location: project location in the host country
- ✓ Legal: ownership
- ✓ Exploration activities: overview of the exploration activities
- ✓ Results: key results of the exploration campaign

The mining assets of EXR are described below in the matrices.

5.4.1 Description of EXR's Mining Operation: The Highveld Mine

Matrix: Mining assets

Mine Description	
Operations Description	✓ Opencast colliery, producing single grade washed product for Eskom power generation. ✓ EXR acquired the mine from a major mining company in year 1.
Host Country	✓ South Africa ✓ The mine is situated in Mpumalanga
Legal	✓ EXR owns 74% of the mine, 26% is owned by a local BEE consortium ✓ EXR has been granted further Prospecting Permits to the south of the property
Geology & Exploration	✓ The mine is an isolated inlayer of Karoo aged sediments ✓ Seam 2 considered for mining, thickness: 10 m. Seam 2 divided into top, mid and bottom seam ✓ Coal quality: Ash 23%, volatiles 21%, CV 22 MJ/kg, sulphur 1.4%
Resources & Reserves	✓ Reserves: 10 Mt ✓ Resources: 30 Mt ✓ Geological loss: 5%, mining loss 15%
Mining	✓ Opencast mining ✓ 10 year LOM ✓ Mining losses: 5% ✓ Stripping ratio: 2:1 ✓ Mining done in-house
Equipment	✓ 3 x 85 ton excavators ✓ 12 x 40 ton Articulated Dump Trucks ✓ 2 x D9 Dozers ✓ 1 x grader ✓ 1 x diesel bowser ✓ 1 x water cart ✓ 2 x Front End Loaders Excavators
Processing	✓ Crushing and single stage beneficiation plant ✓ Overall yield: 73%
Production	✓ Annual planned ROM production: 1.5 Mtpa. ✓ The mine is not achieving this target as a result of poor equipment availabilities. Actual ROM production: 1.2 Mtpa ✓ Planned sales tons: 1.1 Mtpa, actual 0.9 Mtpa
Infrastructure	✓ Mine in close proximity to roads, rail and power ✓ 27 km from nearest town
Logistics & Suppliers	✓ Processing and transportation outsourced ✓ Coal transported via road to Eskom power station
Marketing	✓ 100% of the coal is sold to Eskom, 1.1 Mtpa, CV 20 MJ /kg ✓ Price: R105/t

HR	✓ 170 contractors ✓ There is a skills shortage on the mine.
Environmental & Social	✓ EXR HIV/AIDS programme ✓ Total rehabilitation costs: R12 mill ✓ Rehab fund: R2.5 mill
Financial	**Capex:** ✓ Plant: R27 mill **Opex:** ✓ Total mining and crushing: R70.5/t **Evaluation:** ✓ NPV (12%): R9.0 mill ✓ IRR: 21%
Operations Risk	✓ Poor production performance

5.4.2 Description of EXR's Feasibility Study: Ermelo Project

Matrix: Mining assets

Mine Feasibility Study	
Operations Description	✓ Feasibility study of a high grade, thin seam coal project ✓ EXR has secured an option to purchase mining project from a major mining company. ✓ A prefeasibility study was undertaken on the project in the 1980's and extensive data is available. ✓ The mine will produce steam coal for export markets. ✓ The mine will commence production on year 5.
Host Country	✓ South Africa ✓ The mine is situated in eastern Mpumalanga
Legal	✓ EXR has an option to secure 74% of the mine, 26% needs to go to a local BEE consortium
Geology & Exploration	✓ Ecca Group ✓ Seams: C lower, C upper the top B seam ✓ Seam thickness: 1.2 – 1.7 m ✓ Geological disturbances identified ✓ 55 cored boreholes drilled, 3200 m, 100 samples analysed ✓ Coal quality: Ash 14%, volatile 30%, CV 27MJ/kg, sulphur 11%
Resources & Reserves	✓ Resources: 55 Mt ✓ Reserve: 20 Mt
Mining	✓ Underground bord and pillar mining ✓ Use of continuous miners and shuttle cars ✓ At any point in time, there will be 3 underground operating sections
Equipment	Equipment per section ✓ 1 x continuous miner ✓ 3 x shuttle cars ✓ 1 x roofbolter ✓ 2 x front end loaders

	✓ Stone dusters, underground fans, coal drills, a conveyor belt system with adequate capacity and pumps. ✓ 2 diesel tractor units
Processing	✓ Treatment of 90,000 tpm ROM, 1.08 Mtpa ✓ Washing, screening, dense medium separation, screening to achieve a number of product sizes ✓ Overall yield: 60% ✓ Sales tons: 0.65 Mtpa
Production	✓ Mining rate per underground section: 30 000 tpm, 3 sections: 90,000 tpm
Infrastructure	✓ The mine is well situated in terms of roads, railway siding,
Logistics & Suppliers	✓ The mine has a Spoornet and RBCT siding with rail weighbridge. ✓ Mining, processing and transportation outsourced.
Marketing	✓ Discussions with coal marketers to deliver 1 Mt pa coal ✓ Secured to date: Coal contract: 30,000 tpm to coal trader R194 / t
HR	✓ 100 people to be employed
Environmental & Social	✓ Planned rehab provision: R2.5/t, total fund: R2.5 mill ✓ Detailed environmental studies still required
Financial	**Capex:** ✓ Plant: R112 mill **Opex:** ✓ Total mining, processing and transportation: R120/t **Evaluation:** ✓ NPV (12%): R91 mill ✓ IRR: 32%
Operations Risk	✓ Delay in implementation ✓ Environmental permits

5.4.3 Description of EXR's Exploration Project: Mozambique Exploration Project

Matrix: Mining assets

Exploration Project	
Project Description	✓ 3 concession areas in the Moatize- Minjova basin in the Tete Province ✓ 47,000 ha ✓ Previous exploration in 1980's
Project Stage	✓ Early stage exploration
Host Country / Location	✓ Mozambique ✓ Northeast of town of Tete and Moatize
Legal	✓ Ownership: 50%

Exploration Activities	✓ Phase 1: Interpretation of aerial photography ✓ Phase 2: Geological site visit ✓ Phase 3: Borehole drilling ✓ Phase 4: Airborne magnetic and gravity survey ✓ Phase 5: Infill drilling
Results	✓ No results yet. ✓ Typical coal qualities to be expected: Ash: 30%, Volatile matter 30%, Sulphur 1-1.6%, CV 15 – 25 MJ/kg

5.4.4 Summary: the Mining Asset Portfolio of EXR

The mining assets of EXR are distributed as follows on the Mining Project Value Chain:

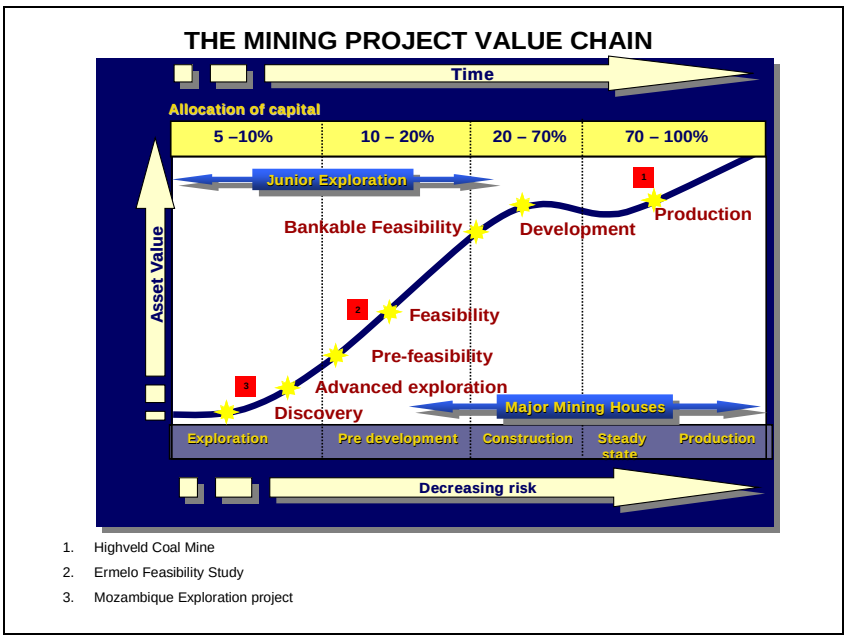


Figure 5.4. EXR mining assets on the mining project value chain

The Highveld Mine is an opencast colliery producing single grade washed product for Eskom power generation from low grade coal. The asset is marginal, has a low risk profile as it is operational and provides limited value growth potential as an investment. Of concern is the poor production performance of the mine. Contrary to this, the Ermelo Project, an asset at a feasibility stage presents an attractive investment opportunity. The mine will mine high grade coal for the export market and margins are high. The risk is medium for this asset as a pre-feasibility study has been conducted. The bulk of the capital has to be spent on developing it. The value growth potential for this asset is large as it grows to a production stage.

The exploration properties in Mozambique are at the bottom end of the chart and the entire growth potential still has to materialize. The risk profile is highest for this asset, as the mineable resources and reserves still need to be confirmed and all the capital needs to be spent on developing this asset. The attractiveness of the EXR is that it represents a balanced portfolio along the entire mining project value chain: a cashflow generating mine, a high value export mine feasibility study and a speculative exploration play.

5.5 Playing the Game – EXR

Playing the game is based on the four pillars: strategy development, legal and financial, operations management, and risk management. Each pillar in turn is defined by steps. Each step is made up of tasks. The four pillars represent the aspect of playing the game, and are constrained and put in balance by the foundation, which make up the rules of the junior mining game.

5.5.1 Strategy Development Pillar

The strategy development pillar entails the steps of business review, strategy development, and strategy implementation. Each step is made up of tasks. For details, please refer to Chapter 3.5.2.

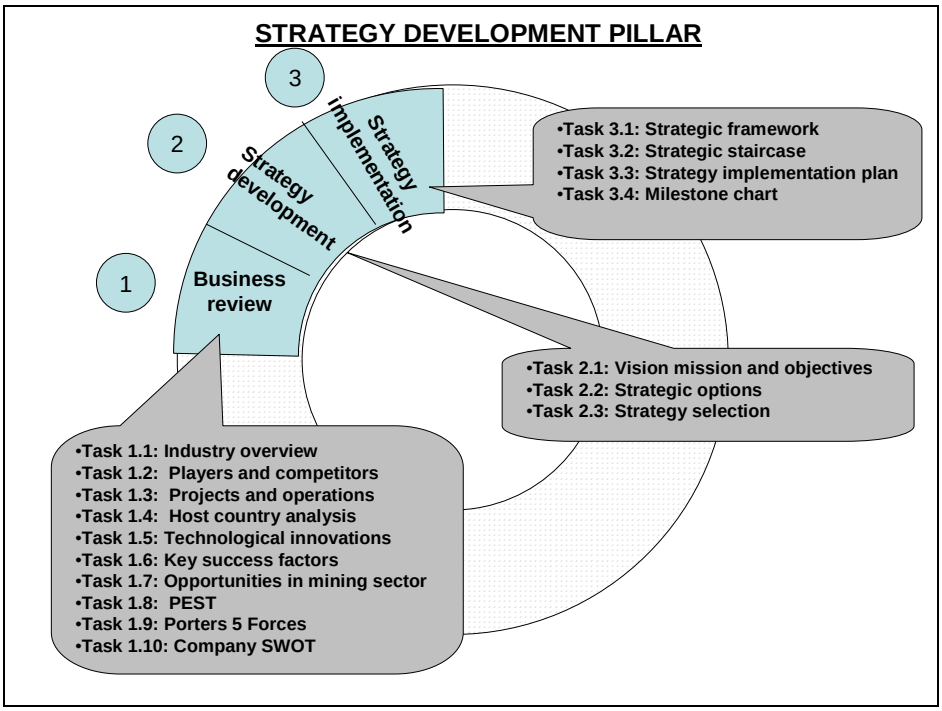


Figure 5.5 EXR strategy development pillar

Step 1. Business Review

Step 1 comprises 10 tasks. These are:

Task 1.1: Industry overview
Task 1.2: Players and competitors
Task 1.3: Projects and operations
Task 1.4: Host country analysis
Task 1.5: Technological innovations
Task 1.6: Key success factors
Task 1.7: Opportunities in mining sector
Task 1.8: PEST
Task 1.9: Porters 5 Forces
Task 1.10: Company SWOT

Task 1.1 Global, regional and local industry overview review

Task	Area of investigation	Description	Matrices and Models
1.1	Global, regional and local resources industry overview	Overview of the applicable resource industry in a global, regional and local context.	Matrix 1.1i) Matrix 1.1ii) Matrix 1.1iii)

Matrix 1.1i) Global resources industry review - coal

Global industry review [87]
Mineral definition: ✓ Coal is a fossil fuel, combustible, sedimentary, an organic rock, which is composed mainly of carbon, hydrogen and oxygen, formed from vegetation, which has been consolidated between other rock strata and altered by the combined effects of pressure and heat over millions of years to form coal seams. **Coalification:** ✓ Coalification is the degree of change undergone by a coal as it matures from peat to anthracite and has important bearing on its physical and chemical properties and is referred to as the 'rank' of the coal. ✓ Low rank coals are coals such as lignite and sub-bituminous coals which have a low-energy content and are used for power generation, cement manufacturing and industrial uses. ✓ Higher rank coals contain more carbon, have lower moisture content, and produce more energy and are suitable for the thermal steam coal and metallurgical coking coal markets. ✓ Anthracite is at the top of the rank scale, has the highest carbon and energy content and is used for domestic industrial uses. **Thermal coal:** ✓ Thermal coal is used in power stations to generate electricity. ✓ Process: The coal is first milled to a fine powder. The powdered coal is blown into the combustion chamber of a boiler where it is burnt at high temperature. The hot gases and heat energy produced converts water in tubes lining the boiler into steam, which is passed into a turbine causing the turbine shaft to rotate at high speed. A generator is mounted at one end of the turbine shaft and consists of

carefully wound wire coils. Electricity is generated when these are rapidly rotated in a strong magnetic field.

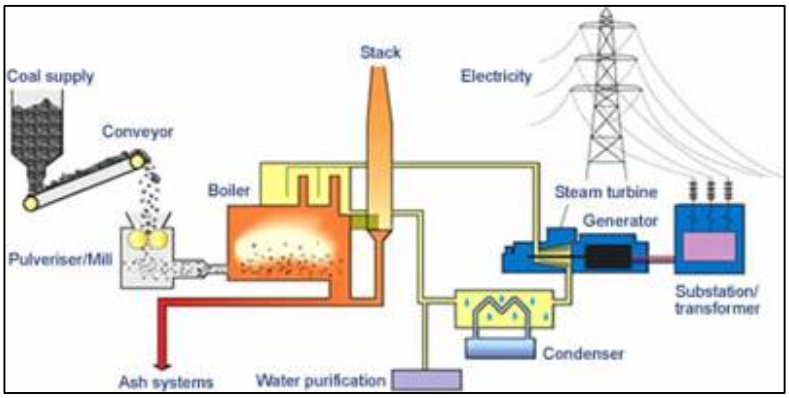


Figure 5.6 Energy generation through coal

Metallurgical coal:

- ✓ Some 66% of steel production worldwide comes from iron made in blast furnaces which use coal.
- ✓ In 2005, global crude steel production used around 664 Mt of coal.
- ✓ A blast furnace uses iron ore and coke, which is made from specialist coking coals. Some furnaces use cheaper steam coal, pulverised coal injection (PCI). The coking coal is crushed, washed and then carbonised in coke ovens.

Global coal production and consumption:

- ✓ The biggest producer of coal in 2004 was China at 2.2 billion tons.
- ✓ South Africa is rated the fifth biggest supplier of coal.
- ✓ Global coal consumption as grown steadily to 5 billion tons per annum.
- ✓ The biggest consumer is the Asia Pacific region at plus 60% of global coal consumption.

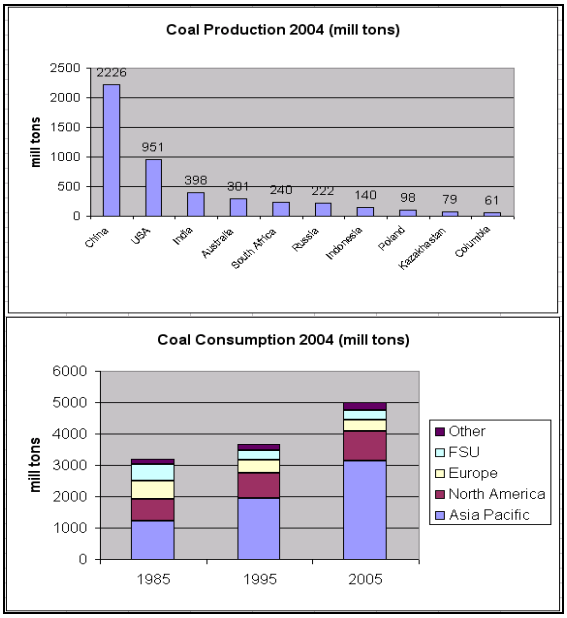


Figure 5.7 Global coal production and consumption

Coal trade:

- ✓ 16% of global hard coal production is traded internationally, of which steam coal makes up the bulk of this international trade.
- ✓ The advantage of coal is that it can be transported to demand centres quickly, safely and easily by ship and rail.
- ✓ Over the last twenty years seaborne trade in steam coal has increased to 7% each year.
- ✓ International trade in coal reached 775 Mt in 2005, accounting for 16% of total coal consumed. Trade in steam coal is divided into two regional markets:
  - ✓ The Atlantic market, which is made up of importing countries in Western Europe including the UK, Germany and Spain.
  - ✓ The Pacific market which consists of developing and OECD Asian importers, notably Japan, Korea and Chinese Taipei.
- ✓ Australia is the world's largest coal exporter. It exported over 231Mt of hard coal in 2005, out of its total production of 301 Mt.

Coal pricing:

- ✓ The World Coal Institute highlights that coal prices have been lower and more stable than oil and gas prices.
- ✓ Coal is likely to remain the most affordable fuel for power generation in many developing and industrialised countries for several decades.

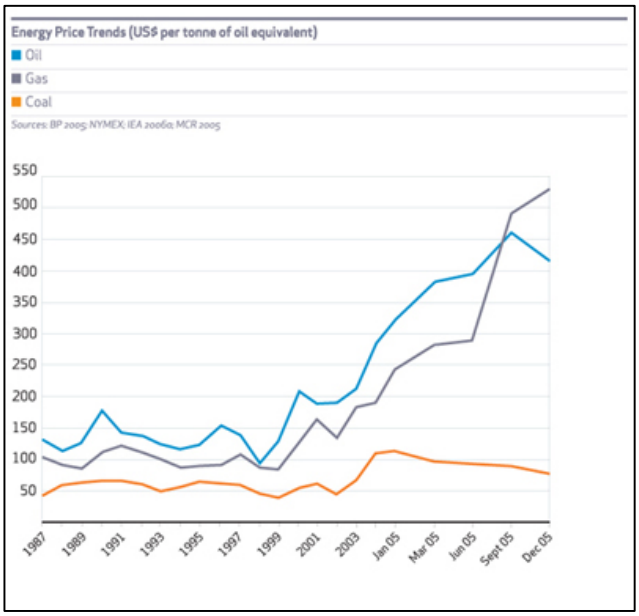


Figure 5.8 Energy mineral prices

Implications for EXR:

- ✓ *The coal market represents an attractive growing market for EXR.*
- ✓ *While coal prices have remained static over the pat 20 years, the author believes increased demand for energy will create upward pressure for coal prices.*

Matrix 1.1ii) Regional resources industry review - coal

Regional resources industry review - The African coal industry [88]
✓ The regional coal industry relates to the coal industry beyond South Africa's borders. It is recognized that South Africa is the largest African coal producer and fifth largest global coal producer and currently no other African country can compete. The following countries are of regional significance to the coal sector: **Mozambique:** ✓ Mozambique has the Moatize coal field, which is under investigation by the Brazilian major mining company CVRD, who are undertaking a feasibility study for a multi-product mine which will feed energy hungry smelter projects, such as Mozal. **Nigeria:** ✓ Coal mining began 1916 in Nigeria. Peak production reached 1 Mtpa. ✓ The coal operations were disrupted by civil war and declined following the discovery of oil. ✓ The country's coal resources are 2 billion tons. ✓ The only coal producer is the Nigerian Coal Corporation, based in Enugu State with 2 operations. ✓ There is a focus on the development of the country's coal potential to alleviate provinces dependence on oil. **Botswana:** ✓ Botswana is the next major coal region after South Africa. ✓ The country's only colliery is the Morupule Colliery, which produces 0.8 Mtpa and supplies coal to Botswana Energy Corporation. ✓ The country hosts the Mmambula Coal Project, a mega coal project to be developed for power station coal and that can be coupled to South Africa's power pool.

Implications for EXR:

- ✓ *Regionally, African countries present the opportunity for EXR to become an early entrant into this market.*
- ✓ *In sub-Saharan Africa, the coal sector is poorly established. As coal is a bulk commodity, any coal mining investment will have to be associated with investment in infrastructure. This may lead to long lead times before coal projects can be successfully become operational.*

Matrix 1.1iii) Local resources industry review - coal

Local resources industry review - The South African coal industry [89,90]

The South African coal industry can be characterized as follows:

Limited reserves remaining in Witbank coal field:

- ✓ Mining companies are running out of easily exploited coal in the Witbank area.
- ✓ The reserves in the main Witbank coal field have an average life of 20 years left and existing reserves cannot provide the current output of the mega-mines with a yearly production of 10 Mt .
- ✓ When the existing collieries are finally depleted, the local and export markets will be seriously affected, as coal quality and production will decrease sharply.

Solution – total extraction :

- ✓ According to Prevost [89] , total extraction of coal reserves and increased use of coal reserves in Witbank and Highveld coalfields offers the only reasonable answer if the life of SA coal industry is to be extended realistically and profitably.

Waterberg coal field:

- ✓ The Waterberg coal field is hailed as an alternative to the Witbank coal field as it has massive reserves.
- ✓ The coal field hosts Exxaro's mega mine Grootegeluk.
- ✓ However, this coal field is far away from industrial centers and the Richards Bay coal terminal, the area lacks of infrastructure and reserves are deep.

Eskom captive mines - price dilemma:

- ✓ Captive Eskom collieries were designed for a 40 year lifespan and have now reached mid-life.
- ✓ These collieries are no longer financially feasible, with higher-quality export coal having to subsidize lower quality Eskom coal.
- ✓ Eskom has indicated that it will procure more coal from small scale empowerment miners, which means that that they will add transport costs to their price when selling to Eskom.
- ✓ As the coal price steadily increases, SA's coal reserves will shrink.

Cost control and underperforming industry:

- ✓ The industry has been falling behind in production and market value: The newly acquired offshore reach of South Africa's major coal mining companies has resulted in reduced investment in local projects and exploration.

Future exploitation patterns:

- ✓ Thick cheap export quality coal is limited in South Africa. The potential market for thin, high quality coal for export depends on coal price.
- ✓ Domestic high ash coal to Eskom has been under-priced making a number of deposits uneconomic.
- ✓ Hence, new projects need to be reviewed as a multi-product project, with export quality coal and power station coal being produced from two stages of beneficiation.

Implications for EXR:

- ✓ *The South African coal industry represents an established, mature industry for EXR, with opportunities for new, smaller players. The industry characteristics are about to change with a change in exploitation pattern, the exit of major miners and the depletion of coal reserves in the Witbank coal field.*
- ✓ *In the long term, the industry will be characterised by many smaller players, which may lead to a consolidation opportunity in the long term.*

✓ *EXR needs to cater for these dynamics in the development of its strategy.*

Task 1.2: Players and Competitors for EXR

Task	Area of investigation	Description	Matrices and Models
1.2	Players and competitors	Understanding and description of major and junior miners in the game that compete with the company: company description, corporate structure, vision and strategy, mining assets, the team, financial performance.	Matrix 1.2i) Matrix 1.2.ii)

Players: major coal mining companies

The major coal mining houses in South Africa are Exxaro, Anglo Coal, BHP Billiton, Xstrata and Sasol Mining. A general description is provided of the first three majors, with an overview of their operations, from the review of their company websites as well as their annual reports. EXR needs to bear in mind that these companies are potential customers as EXR may want to sell or joint-venture its feasibility studies with these major miner companies. These companies can also be competitors as they may be contending for the same Prospecting Permits that EXR will be applying for. EXR also may want to consider identifying and purchasing one of the non-core mining assets of these companies.

Competitors: Coal junior mining companies

EXR's competitors are coal junior mining companies that are developing a medium sized coal portfolio and are listed on an international mining venture exchange. EXR is aiming for listing on an international stock exchange. On the Johannesburg Stock Exchange there are few pure coal players listed, so the competitor search is aimed at junior mining companies in the coal sector on the exchanges TSX, AIM and ASX. Three competitors have been identified and have been analysed with the purpose of creating a benchmark for EXR: MacArthur Coal, Riversdale Mining and CoalCorp Mining.

Matrix 1.2i) Major coal mining companies - Exxaro

1	**Company Description - Exxaro** [91]
	Exxaro Coal is the coal mining company formed from the merger of Kumba Resources and Eyesizwe. The company is one of South Africa's largest coal producers with a well-balanced portfolio of coal operations and projects and a production capacity of 45 Mtpa. It is the largest supplier to South Africa's power utility, Eskom. Exxaro's strategy is to grow in the metals reductant and energy markets by focussing on people and superior processes, value growth and targeting an output of 70 Mtpa by 2012.
2	**Operations**
	Matla: Matla comprises three fully mechanised underground mining complexes employing continuous mining and shortwall methods, producing 14Mtpa of power station coal with a workforce of over 1400. The mine supplies thermal coal to Eskom's Matla mine in terms of a cost-plus agreement. The mine has a coal reserve base is of 297,3Mt and a resource base of 41,7Mt. **New Clydesdale:** a coal mine that uses both openpit and underground mining methods and produces 4Mtpa of A- and D-grade thermal coal primarily for sale to the export market 140 km east of Johannesburg. The reserve base is 14Mt and the resource 41Mt. **North Block Complex:** an underground complex consisting of the Glisa and Strathrae coal mines and the Eerstelingfontein and Belfast coal projects. The complex produces 3Mtpa of thermal coal for the domestic and export markets, employs 170 people, uses both underground and open-pit mining methods and has a reserve base of 8Mt and a resource of 10Mt. **Arnot:** an underground mine that produces 5Mtpa of power station coal using mechanised mining methods. The mine supplies Eskom's Arnot power station until 2015, "cost-plus" agreement in which there is a return on investment and a management fee. The mine has a reserve base of 70,3Mt and a resource of 216,1Mt. **Grootegeluk:** a mega openpit mine that produces 18,8Mtpa of thermal and semi-soft coking coal using a conventional truck and shovel operation. The mine has the world's largest beneficiation complex. Run-of-mine coal is upgraded in five different plants. The mine has a reserve base of 740Mt and a resource of 12,100 Mt. **Leeuwpan:** Leeuwpan produces 3Mtpa of metallurgical and power station coal using conventional open-pit mining methods. Coal is processed using a specific jigging technology. The coal reserve base is 143Mt and the resources 160Mt. **Tshikondeni:** an underground mine producing 0.4 Mt of premium hard coking coal. The coal product is trucked and railed to Mittal SA's works at Vanderbijlpark under a long-term agreement at the cost of production plus a management fee of 3%. The reserve base is 6Mt and the resource 36Mt.

Matrix 1.2i) Major coal mining companies – Anglo Coal

1	**Company Description – Anglo Coal** [92]
	AngloCoal is a global coal mining company with operations in South Africa, Australia, Colombia and Venezuela. The company produces thermal and metallurgical coals for international customers in the Med-Atlantic and Indo-Pacific markets as well as local customers in South Africa and Australia. Anglo Coal and BHP Billiton are jointly investigating the proposed expansion of coal reserves in the western extremity part of the Witbank Coalfields area in South Africa.
2	**Operations (South Africa)**
	Bank Colliery: an underground mine mining the No. 2 and No. 5 Seam mines. The mine produces pulverised coal injection and thermal coal for export and domestic customers, 25km north-east of Witbank **Goedehoop Colliery:** an openpit mine producing pulverised coal injection and thermal coal for export customers, as well as low-grade coal for the domestic market. **Greenside Colliery:** an underground mine 20km west of Witbank which produces pulverised coal injection and thermal coal for domestic and export markets. . **Isibonelo:** an opencast mine which produces 5 Mtpa of thermal coal when it reaches full production during 2006. **Kleinkopje Colliery:** a coal mine, 10km south-west of Witbank, which produces washed, sized coal for the local steel industry and thermal coal for export. **Kriel Colliery:** an underground and opencast coal mine supplying coal to Eskom's Kriel power station. **Landau Colliery:** an underground mine producing pulverised coal injection and thermal coal for export and washed sized coal for the domestic market. **New Denmark Colliery:** an underground mine employing shortwall mining methods established in the 1980s to supply coal to Eskom's Tutuka power station. **New Vaal Colliery:** an opencast mine producing 18 Mtpa of thermal coal to supply Eskom's Lethabo power station. **Mafube:** an opencast mining project, undertaken in a joint venture with Eyesizwe to mine the Arnot North coal reserves, known as Mafube Colliery.

Matrix 1.2i) Major coal mining companies - BHP Billiton Energy Coal

1	**Company Description – BHP Billiton** [93]
	BHP Billiton Energy Coal South Africa Ltd is one of the largest energy coal exporters in the world, owns and operates five collieries in South Africa: Douglas, Khutala, Klipspruit, Middelburg and Optimum. The company is the single largest shareholder of the Richards Bay Coal Terminal. The companies production totaled 52 Mtpa of steam coal to the export and local market. Market.
2	**Operations**
	Optimum Colliery: an opencast coal mine producing 13.5 Mtpa. The mine supplies coal to three markets: the Hendrina Power Station, inland destinations and the overseas steam coal market. The mine has a 17 year mine life **Klipspruit Colliery:** a new opencast colliery utilising the latest technologies and mining procedures. The mine opened in 2003 and produces 3.6 Mtpa. Coal is produced for the export and inland markets. **Douglas Mine:** a mine with both opencast and underground sections. The mine is co- owned by Xstrata (16 per cent) and managed by BHP. The mine produces some 8.5 Mtpa and supplies its products into the export, domestic and local power station markets. The life of the mine is 15 years. **Koornfontein Mine**: an underground mine using continous miners to extract coal from the number 2 and 4 seams. The mine produces 6 Mtpa export quality steam coal and supplies to the local Eskom power stations. The remaining life of mine is 4 years. The mine is in the process of being sold to a BEE consortium. **Middelburg Mine:** the largest mine in the group is an opencast mine using 5 draglines to produce up to 17 Mtpa coal from the number 2 and 4 seams. Products are power station grade coal for Eskom's Duvha Power station and higher quality export grade products for the seaborne steam coal markets. The life of the mine is 30 years. **Khutala Colliery:** The mine is one of the largest underground coal mines in the world, producing 15.1 Mtpa, exclusively for Eskom's Kendal power station. The underground operation has 16 continuous miner sections working on a double shift basis. The mine also has an opencast operation mining at a rate of 3.5 Mtpa using contractors. The life of the mine is 24 years.

Matrix 1.2ii) Competitors - MacArthur Coal [94,95,47]

Company description

- MacArthur is an Australian junior mining company focussed on the exploration, development and mining of low volatile PCI coal.
- The company's portfolio ranges from the well-established Coppabella Mine and the new Moorvale Mine through to a range of prospective coal exploration tenements.
- The company supplies coal to steel mills of Asia and Europe

Corporate structure

Shareholders:

- ✓ Ken Talbot and related entities: 36%
- ✓ CITIC Australia Coal Pty Ltd: 12%
- ✓ JP Morgan Nominees: 8%
- ✓ ANZ Nominees:

Listing: ASX

Shares

- ✓ Isued:29 mill
- ✓ Fully diluted: 33 mill

Shareprice: Aus$ 4.9

Market Cap: Aus $ 20 mill

Mines

- Coppabella Mine: openpit mine, 4.2 Mtpa, mining contractor mining. Product: metallurgical PCI coal. Resource 217 Mt, reserve 79 Mt
- Moorvale Mine: openpit mine, 3.3 Mtpa, multiproduct mine. Resource 128 Mt, reserve 37 Mt

Mine development projects

- No projects

Feasibility studies

- No feasibilities

Exploration projects

- 12 Exploration projects. Right to earn 50% and increase to 75%

Team (qualification, years experience)

Board of Directors

- ✓ Chairman
- ✓ Deputy Chairman
- ✓ Non Exec Director: 40 years
- ✓ CEO: Min Engineer, 34 years

Management:

- ✓ Deputy CEO: BBus, 15 years
- ✓ Company Secretary: BBus, 25 years
- ✓ CFO: BBus, MBA, 18 years
- ✓ VP Underground: BEng, 28 years
- ✓ VP Operations: BSc Eng Min, 23 years

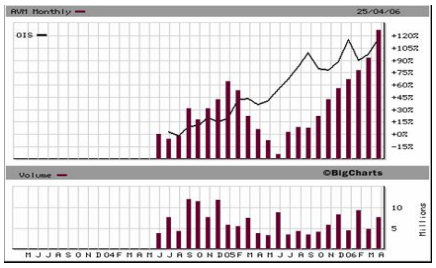
Financial Performance

MacArthur Coal			Share price ($)	4.89	
Income statement ($ mill)	2006	2005	**Balance sheet ($ mill)**	2006	2005
Revenue	534	370	Current assets	319	199
Cost of sales	-287	-232	No current assets	272	241
Gross profit	**247**	**137**	**Total assets**	**592**	**440**
Net profit before tax	**214**	**89**			
Profit/loss for year	**149**	**64**	Current liabilities	121	130
Earnings per share ($)	$0.83	$0.40	Non current liabilities	79	73
			Total liabilities	**200**	**204**
			Total equity	**391**	**236**
Cashflows	2006	2005	**Ratios**	2006	2005
From operating activities	201	107	Current ratio	2.6	1.53
From investing activities	37	-56	Debt ratio	34%	46%
From financing activities	-88	-44	Gearing	17%	24%
Cash at year end	**168**	**18**	**PE ratio**	**5.9**	

Capital raising

Equity			
Date	Activity	Capital raised	Comment
Loans			
Date	Loan $mill	Institution	Terms
2005	14	Non recourse project finance facility	5.5% Security: Equity interest in Coppabella & moorvale
2005	30		6.50%

Shareprice



Comment:

The share price has risen, fallen and risen again. MacArthur can be can be classified as a medium market performer.

Matrix 1.2ii) Competitors - Riversdale Mining [96,47]

Company description

- Riversdale Mining Limited is a junior mining company focussed on the acquisition and development of coal projects in southern Africa. The company has an operating mine, a feasibility study and an exploration project.
- Riversdale is focused on prioritising the acquisition of assets that are either already earning cash, or close to that stage. Projects have to have an IRR of 20%.
- The company actively seeks partnerships, believes in decentralised management of businesses and will be an active capital manager when the opportunity allows.
- Riversdale intends to develop as a diversified mining finance house, focused on growth through investment in suitable mining opportunities.

Corporate structure

Shareholders:

- ✓ RBC Global Services Australia 10%
- ✓ Citicorp Nominees: 5%
- ✓ Tricom Nominees: 4%
- ✓ ANZ Nominees Ltd 3%

ASX, Code RIV

- ✓ Issued shares: 49 mill
- ✓ Fully diluted shares: 93 mill

Share price: Aus $ 1.26
Market Cap: Aus$ 86 3mill (Dec 2005)

Mines

- **Zululand Anthracite Colliery:** low seam underground colliery in complex KZN coalfield, producing 3 Mtpa of anthracite for export and inland markets.
- Resource: 8 Mt, reserve 10 Mt.

Mine development projects

- No projects

Feasibility studies

- Riversdale Anthracite Colliery: Low sulphur underground anthracite project. Forecasted production: 0.5 Mtpa. 12 year life of mine.

Exploration projects

- 203,000 ha tenement in Mozambique adjacent to CVRD property
- Exploration properties in close proximity to existing operation

Team (qualification, years experience)

Board of Directors

- ✓ CEO and Chairman: BSc Met, 30years
- ✓ Finance Director: BCom, 20 years
- ✓ Non Exec: BSc Eng Min, 35 years
- ✓ Non Exec: BSc Eng Min, 35 years
- ✓ Non Exec Director: BCom

Management:

- ✓ Operations Manager
- ✓ Finance Manager

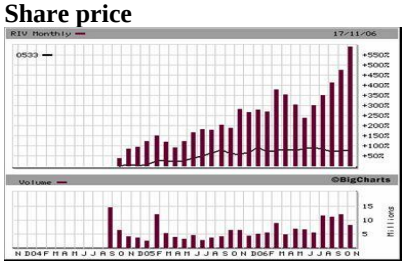
Financial

Riversdale Mining			Share price ($)	1.26	
Income statement ($ mill)	2005	2004	**Balance sheet ($ mill)**	2005	2004
Revenue	677	4,424	Current assets	19.0	0.6
Cost of sales			No current assets	3.6	0.9
Gross profit			**Total assets**	**23.0**	**1.4**
Net profit before tax	**-1,829**	**3,962**			
Profit/loss for year	**-1,829**	**3,962**	Current liabilities	15.0	0.0
Earnings per share ($)	-$5.57	$0.70	Non current liabilities	0.0	0.0
			Total liabilities	**15.0**	**0.0**
			Total equity	**7.8**	**1.4**
Cashflows	2005	2004	**Ratios**	2005	2004
From operating activities	-1	-0.3	Current ratio	1.3	40.00
From investing activities	-3.7	-1	Debt ratio	65%	1%
From financing activities	7.7	1.8	Gearing	0%	0%
Cash at year end	**3.6**	**0.5**	**PE ratio**	**-0.2**	

Capital raising

Equity			
Date	Activity	Capital raised	Comment
2005	Issued0.995 mill shares at $0.55 per share	$194 mill	
2005	Issued 10.4 mill shares at A$0.48 per share	$5mill	
Loans			
Date	Loan $mill	Institution	Terms

Share price



Comment:

The share price has constantly grown and is above the index.
Riversdale can be classified as a top market performer.

Matrix 1.2ii) Competitors - CoalCorp Mining [97,98,47]

Company description

- Coalcorp is a coal mining, exploration and development company with a 100% interest in the La Francia and Caypa coal mines, two ports to be developed and an interest in a rail line operator, all located in Columbia.
- Coalcorp intends to fill a void in the Colombian coal industry that is characterized by a few large coal producers and several small coal producers.

Corporate structure

- ✓ Shareholders: No information
- ✓ Listing: TSX, Code CCJ
- ✓ Shares: Issued: 397 mill, fully diluted: 631 mill
- ✓ Share price: US$ 0.53
- ✓ Market Cap: $ 15mill (Dec 2005)

Mines

- La Francia Mine: opencast and underground mine, 2 Mtpa. Resource 30 Mt, reserve 29 Mt
- Caypa Mine: underground mine, production 0.5 Mtpa, 12 years life of mine.

Mine development projects

- No mine development projects.

Feasibility studies

- Feasibility study regarding development of coal port and coal railway line

Exploration projects

- 7000 ha exploration concessions in the Caesar region in Columbia

Team (qualification, years experience)

Board of Directors

- ✓ Chairman
- ✓ CEO: 20years
- ✓ President / Director: 20years
- ✓ President Columbia
- ✓ CFO

Management:

- ✓ VP Exploration
- ✓ VP Bus Development
- ✓ General Council and Secretary

Financial Performance

Coalcorp			Share price ($)	0.68	
Income statement ($ mill)	2006	2005	**Balance sheet ($ mill)**	2005	2004
Revenue	30	-	Current assets	93	3
Cost of sales	28	-	No current assets	234	0
Gross profit	**2**		**Total assets**	**327**	**4**
Net profit before tax	**-4**	**-12**			
Profit/loss for year	**-3**	**-12**	Current liabilities	26	1
Earnings per share ($)	-$0.02	-$0.48	Non current liabilities	81	0
			Total liabilities	**107**	**1**
			Total equity	**220**	**3**
Cashflows	2005	2004	**Ratios**	2005	2004
From operating activities	-13	0	Current ratio	4	6
From investing activities	-187	3	Debt ratio	33%	16%
From financing activities	0	0	Gearing	27%	0%
Cash at year end	**5**	**3**	**PE ratio**	**-34**	

Capital raising

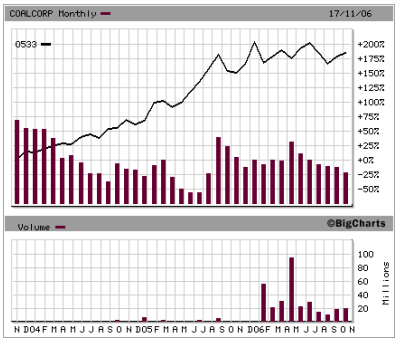
Equity

Date	Activity	Capital raised	Comment
2006	Issued 345 mill subscription receipts at $0.6 per subscription receipt.	$194 mill	

Loans

Date	Loan $mill	Institution	Terms
2006	7.5	Private	1% pm
2006	1.5	Private	4.75%, unsecured
2006	0.5	Private	4.75%, unsecured
2006	1.5	Private	4.75%, unsecured
2006	2.5	Private	4.75%, unsecured
2006	4.6		Libor +2.4%
2006	8.3		Libor +2.4%
	26.4		

Shareprice



Comment:
The share price has fallen and is below the index. CoalCorp can be classified as a poor market performer.

Implications for EXR:

The following graphs position EXR versus South African major coal miners and international coal juniors:

Production performance:

- ✓ *The actual and anticipated production performance of the EXR mining assets are marginal when compared to those of major miners, but they are in line with the average of the international coal mining juniors.*

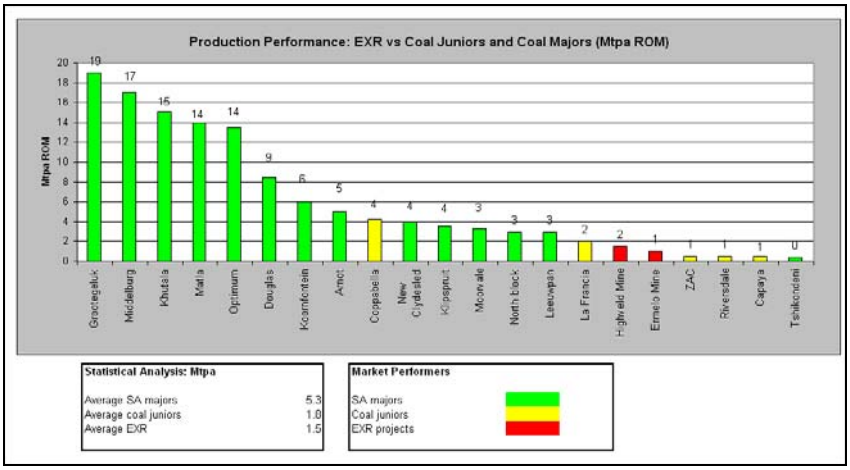


Figure 5.9 Production performances of coal players

Reserves:

- ✓ *The average reserve basis of EXR is at 15 Mt below the average of the analysed coal juniors which is at 35Mt.*
- ✓ *The major miners average at 190 Mt.*
- ✓ *The focus for EXR must be to increase the reserve base.*

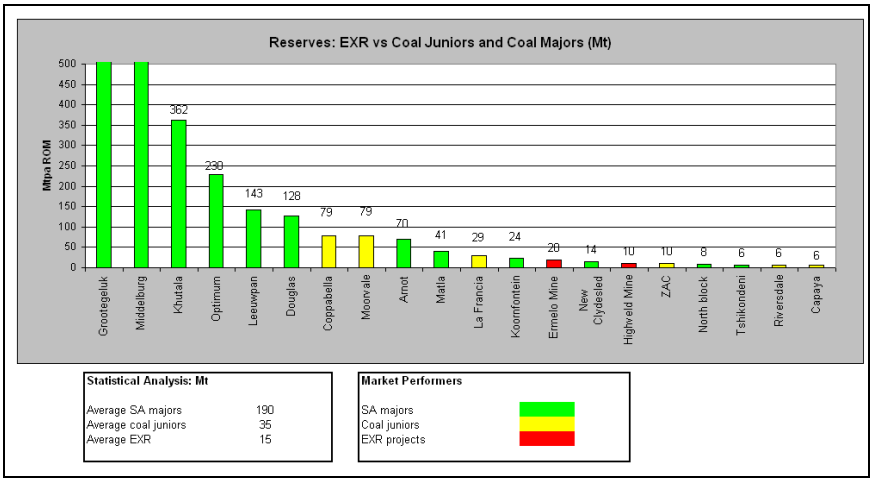


Figure 5.10 Reserves of coal players

Resources

- ✓ *The resources basis of EXR is at 43 Mt below the average of the analysed coal juniors which is at 96 Mt.*
- ✓ *The major miners average at 1823 Mt.*
- ✓ *To compete in the junior coal mining game, EXR must increase the resources base to above 100Mt.*

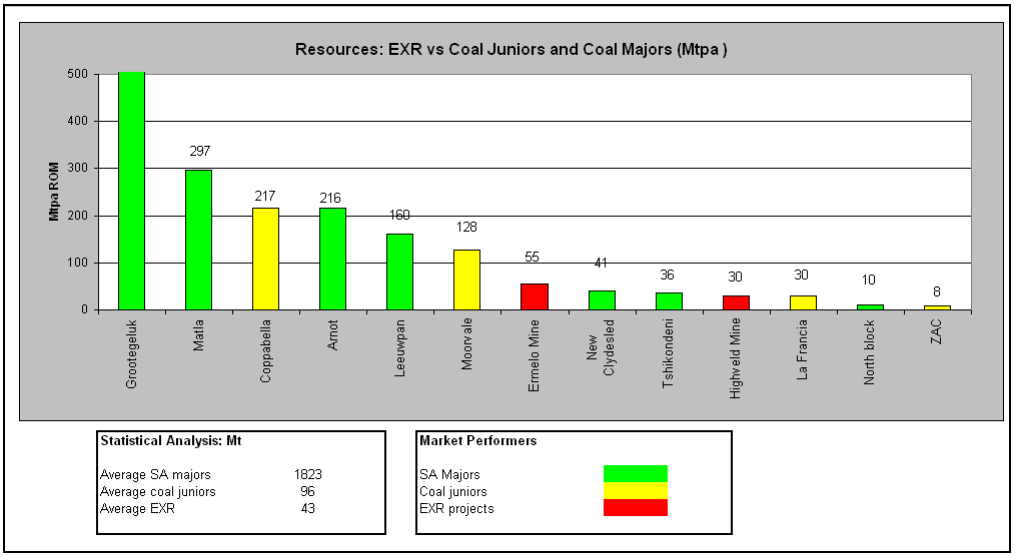


Figure 5.11 Resources of coal players

Task 1.3 Typical Projects and Operations

This entails a review of coal projects and operations.

Task	Area of investigation	Description	Matrices and Models
1.3	Projects and operations	Types of operations applicable to the commodity determined and classified into exploration projects, feasibility studies, mine development projects and mines. Description of geology, exploration activities, resources and reserves, mining, processing, production, infrastructure, logistics and suppliers, marketing, human resources, SHEQ and financial data.	Matrix 1.3

EXR is a company that has coal mining assets in South Africa, and that intends to expand into sub-Saharan Africa and wants to list on an offshore stock exchange. The review of projects and operations will thus entail a review of typical coal operations and projects in South African operations, sub-Saharan Africa as well as those international coal operations of listed coal junior mining companies.

The following coal projects and operations are presented:

- ✓ Witbank coal mines (South African)
- ✓ Kwazulu coal mines (South African)
- ✓ African mega coal mines
- ✓ African medium sized coal mine
- ✓ Australian coal mining operations

Matrix 1.4) Projects and operations –coal mines and rojects

Category	**1. Typical Witbank coal mine** [99,100]	**2. Low seam Ermelo / Kwazulu coal mines** [101,102,103]	**3. African mega coal mine** [104,105]
Description	Medium sized opencast mines focussing on mining remnant coal blocks in Witbank coalfield	Small, thin seam underground anthracite mines in geologically complex KZN coalfields	Large coal mining projects, entailing a steam coal mine with the potential of establishing a powerstation Eg: Grootegeluk – Exxaro Coal
Example - collieries	Mafube Coal, Holfontein	Vaalkrantz, Springlake Colliery, Riversdale Anthracite Colliery	Mmambula Energy Project (Botswana),
Geology and Exploration	Witbank coalfield Thermal coal for Eskom, inland and export market	Klipriver – Vryheid coalfield, structurally complex, CV 30 MJ/kg, Sulphur 1.5 – 2%, Ash 11-14%, anthracite, seam height 0.8 – 2m	Large scale opencast or underground thermal coal deposits, eg the Waterberg
Resources and reserves	Resources: 56 - 75 Mt	Resources: 10 Mt Reserves: 8 Mt, yield 65%,	Resources: 500 – 1,000 Mt
Mining	Opencast mining, truck and shovel LOM+ 20 years	Underground mining, low seam bord and pillar, stooping on retreat, coal cutters, scoops, feeder breakers, roof bolters	Openpit and underground
Processing	Crushing, screening, washing	Washing plant, 200 -300 tph capacity	Washing plant, reduction of sulphur key
Production	1 – 1.5 Mtpa ROM	0.5 - 1 Mtpa	12 – 15 Mtpa
Infrastructure	Close proximity to existing mining infrastructure	Adits to gain access to operations	Close proximity to road, rail water, linkage to power station
Logistics and suppliers	Extensive use of mining contractors: eg. Diesel Power	Extensive use of mining contractors: eg. Diesel Power	International, high brand mining consultants doing feasibility studies
Marketing	Client: Eskom power stations Export coal to Europe and Asia	Market: ferrochrome industry, product – reductant Europe, South America R750/t	Market: power stations - utilities R750/t
Human resources	250 people, mainly subcontractors		1200 jobs
Environmental			Extensive community involvement
Financial	Capex: R30 mill		Capex: US$5 bill – may include power station IRR: 50%

Matrix 1.4) Projects and operations - coal mines and projects

Category	**4. African coal mine** [106,107]	**5. Australian coal mine** [94]
Description	Operational coal mines with the potential of increasing production performance considerably. Co-ownership by government.	Medium sized, modern operational coal mines with high efficiency levels, mining low volatile PCI coal.
Example - collieries	Maamba Colliery, Morupule Colliery	Coppabella Mine, Moorvale Mine
Geology and Exploration	Maamba – Gwembe Formation, Moruple – extension of Waterberg	Low volatile PCI coal, ash 9-14%, seam thickness: 10m
Resources and reserves	Resources: 160Mt to 200 bt	Resources: 130 – 210 Mt Reserves: 30 – 80 Mt
Mining	Maamba: openpit – draglines and truck and shovel Morupule: underground mining, conventional mining	Openpit mining, 3km strip, draglines
Processing	Traditional coal washing plants with poor availabilities.	Modern, modular coal preparation plants, 3 stage crushing, DMS cyclones, 600 - 800 tph
Production	Suboptimal production levels Morupule: 1Mtpa Maamba: 0.2 Mtpa	Coal production: 3-4.5 Mtpa Stripping ratio: 3:1
Infrastructure	Maamba: old infrastructure with poor efficiencies Morupule: arid region – underground water storage critical	Close proximity to roads, rail and ports
Logistics and suppliers		Use of mining and coal processing contractors
Marketing	SADEC power stations, Zambian smelters and cement manufacturers. $57/ton Future markets: industrial projects in Africa	Products: PCI coal, coking coal, ultra low volatile coal, thermal coal
Human resources	300 – 800 jobs	Focus on contractor management
Environmental	SADEC power stations and Zambian smelters and cement manufacturers.	Extensive management of environmental compliance and environmental impact
Financial	Maamba requires $45 mill capital investment	Focus on cost control

Implications for EXR:

- ✓ *EXR's mining assets are represented in categories 1, 2 and 3.*
- ✓ *The Highveld Mine is a typical Witbank coal mine, category 1.*
- ✓ *The Ermelo Project is a typical mine in category 2, low seam Ermelo / Kwazulu Natal coal mines.*
- ✓ *The Mozambique exploration tenements have the potential to be developed to an African mega coal mine, category 3.*

Task 1.4 Host Country Analysis

Task	Area of investigation	Description	Matrices and Models
1.4	Host countries	Analysis of the host countries of the JMC and the associated country related implications.	Matrix 1.4

The host countries of EXR' mining assets are South Africa and Mozambique. These countries are analysed with their related implications for EXR's game plan.

Matrix 1.4 Host country - South Africa [(108)]

Regional setting	✓ Neighbouring countries: Namibia, Botswana, Mozambique
Social environment	✓ Population: 43 million ✓ High HIV/AIDS rate
Physical environment	✓ Rapidly increasing middle class ✓ Railways carry freight and passengers throughout the country. ✓ South African Airways serves all major cities ✓ The road system is generally good and extensive. Many urban commuters take minibus taxis or cars to work. ✓ Advanced telecommunication system ✓ The press enjoys freedom. ✓ Medical services are mainly public, but some private sector participation is incorporated.
Political environment	✓ Pre 1994: Apartheid ✓ Post 1994: Free and fair elections, ANC in government ✓ Key issue: presidential election 2009, high crime rate
Economic environment	✓ Since 1994, the government has set forth economic reform measures, but the country is troubled by low growth and a high unemployment rate. ✓ The country's economic wealth was founded on diamonds, gold, together with base metals, mineral products and platinum. ✓ Manufacturing has been dominated by iron and steel, engineering, vehicles, and chemicals. ✓ Sectors such as tourism could make an increasing contribution. ✓ The currency is the Rand. ✓ Major drive : Black Economic Empowerment
Mining activities	✓ One of the world's and Africa's most important mining countries in terms of the variety and quantity of minerals produced. ✓ Has the world's largest reserves of chrome, gold, vanadium, manganese and PGM's. ✓ Key events: phasing out of mining houses. The mining industry has seen restructuring and changes since the early 90's with the traditional "big six" mining houses - Anglo American, De Beers, Gencor , Billiton, Goldfields, JCI, Anglovaal and Rand Mines being restructured ✓ The phasing out of the concept of mining houses has opened the door for

	consulting engineers serving the mining industry to be involved in projects ✓ Emphasis is being placed on stimulating black empowerment in the industry. ✓ As a result, several black or union owned firms are now beginning to play an important role in the industry.
Mineral legislation	✓ Universal access to mineral resources ✓ State intervention: need for legislative change recognized ✓ Mineral and Petroleum Resources Development Act 2004 ✓ Mining Charter 2002 ✓ Scorecard ✓ State becomes custodian of mineral rights in line with international norms ✓ Concerns over the security of tenure
Organisations and personalities	✓ Chamber of Mines represents the major mining houses. ✓ New players: Mvelaphanda, with Tokyo Sexwale, African Rainbow Minerals, a company formed in 1997 by Patrice Motsepe
Implications for EXR	✓ *High population growth and economic development will increase the demand for coal generated energy in South Africa, coal is an attractive market to play in South Africa.* ✓ *Competition to be expected from emerging BEE players in coal as new players are expected to enter the game.* ✓ *Restructuring of mining houses has lead to a flight of skills, skills shortage to be expected.* ✓ *Right of tenure and possible state intervention may become a concern to international investors in EXR.*

Matrix 1.4 Host country - Mozambique [109]

Regional setting	✓ Neighbouring countries: Tanzania, Malawi, Zambia, Zimbabwe, South Africa and Swaziland.
Social environment	✓ Population: 18 million, 67% of the adults are illiterate ✓ 85% of the people live in rural areas
Physical environment	✓ The infrastructure which was created during the Portuguese colonial rule has been extensively damaged the by civil war. ✓ Lateral infrastructure routes from Maputo and Beira to Zimbabwe and Malawi are adequate, while the north south links are weak and severely declined. ✓ The agricultural sector in the north is isolated. ✓ Maputo port serves South Africa, Swaziland and Zimbabwe. Beira port serves Zimbabwe, Zambia, Malawi, Botswana and the DRC. ✓ The railway lines are currently being rehabilitated.
Political environment	✓ Mozambique's civil war between Frelimo and Renamo erupted in the 70s and lasted until 1992, leading to the destruction of the country's infrastructure. ✓ Free elections were held in 1997. ✓ Mozambique is a member of SADC and has good relationships with the USA, Japan and Europe. ✓ The current threat to security is banditry from demobilized soldiers.
Economic environment	✓ An economic reform program was endorsed in 1997 leading to an improvement in macro economic performance, the promotion of private sector investment, the rehabilitation of the infrastructure and social investment. ✓ Mozambique has extensive coal and natural gas reserves and hydroelectric capacity. ✓ Projects worth US$ 10 billion have been initiated.
Mining activities	✓ Mining contributes 2% to GDP. ✓ Most of the country's official mineral output is derived from three mining concerns, which include gold, bauxite and graphite. ✓ Most of the major projects currently undergoing construction or feasibility are focussed on heavy mineral sands, coal, natural gas as well as, downstream, aluminium smelters, hot briquetted iron and steel plants. ✓ Mozambique has an estimated 50 000 artisanal workers who concentrate on alluvial gold and gemstone workings. ✓ Very little investigation has been made in Mozambique for base metals.
Mineral legislation	✓ In general, large scale and foreign investment projects are subject to individual licensing agreements. ✓ Basic license conditions are a Reconnaissance licence, an Exclusive Exploration License for 4 years and a Mining licence valid for 25 years.
Organisations	✓ Government organisations are the Ministry of Mineral Resources, Ministry of Mineral Resources and Energy (Mozambique) and the National Directorate of Mines, Sociedade Mineira Comercial Lda ✓ Kenmare is the first junior mining company to develop a large mine in Mozambique. ✓ There are mainly explorers active in Mozambique.

Implications for EXR	✓ *The poor status of infrastructure will make it difficult for EXR to develop a conventional, producing coal mine similar to South Africa.* ✓ *The country is only emerging as a mining player and EXR can expect significant support from local authorities who are keen to further mining activities in the country.* ✓ *The coal hosting areas in the Tete province are a long distance from the Maputo harbour.* ✓ *The Anglo-Saxon team of EXR needs to learn Portuguese and consider professional translators in order be able to conduct business appropriately with local government agencies, affected communities and suppliers.* ✓ *The focus needs to be on exploration and feasibility studies, in order to minimize capital outlays. Also, unconventional coal extraction to be investigated.*

Task 1.5 Coal Technology and Implications for EXR

Task	Area of investigation	Description	Matrices and Models
1.5	Technology	A review of technological trends pertaining to the commodity market and implications for the JMC.	Matrix 1.5

The following technological aspects and factors are pertinent to the coal sector and will affect EXR:

Matrix 1.5 Technology and implications for JMC

Technology	Implication for EXR
The need for clean coal: [87] ✓ The use of coal creates a number of environmental challenges. The primary environmental issues relating to the use of coal are particulate emissions, trace elements , NOx, SOx , waste from coal production and CO_2. ✓ Clean coal technologies are developed to overcome the challenges associated with the use of coal. ✓ These include advanced coal combustion technologies, improving efficiency levels by increasing the amount of energy that can be extracted from a single unit of coal, fluidised bed combustion , supercritical and ultra supercritical boilers and integrated gasification	✓ *EXR is in the business of exploring for and mining coal and is not an end user of coal.* ✓ *The company has no influence on the reduction of emissions through technology.* ✓ *However, the company can engage with clean coal end users and facilitate the development of those coal properties that will provide feedstock to these users.* ✓ *Routes to consider are upgrading of coal through washing as well as investigating the opportunity of coal briquetting.*
Coal liquification: [87] ✓ Coal can be converted into a variety of fuels that are sulphur-free, low in particulates, and low in nitrogen oxides. ✓ Coal liquids can be used for transport, cooking, stationary power generation, and in the chemicals industry. ✓ South Africa has been producing coal-derived fuels since 1955 and SASOL is the only commercial coal to liquids industry in operation today, with 30% of the country's gasoline and diesel needs being produced from indigenous coal.	✓ *EXR could provide feedstock to coal liquefication giant SASOL.*
Coal gasification: [87] ✓ Underground coal gasification involves drilling two wells into the coal, one for injection and another well to bring the product gas to the surface. ✓ The coal at the base of the first well is heated to temperatures that would normally cause the coal to burn but through careful regulation of the oxidant flow, the coal does not burn but rather separates into the syngas. ✓ The syngas is then drawn out of the second well. ✓ The syngas is a product that can be used for industrial	✓ *EXR should review coal reserves in SADEC countries with potential to undertake UG coal gasification project.* ✓ *The potential should exist to undertake a feasibility study and to take the project up the value curve and then sell the feasibility to a major coal miner.*

heating, power generation or the manufacture of hydrogen, synthetic fuels or other chemicals.	
Methane from coal: [110] ✓ Methane is formed in the process of coal formation and when the coal is mined it is released from the coal seam and the surrounding disturbed strata. ✓ It is the major component of natural gas. ✓ Methane can be recovered through Coal Mine Methane (CMM) and Coal Bed Methane (CBM). ✓ CMM captures the methane that is released or will be released during coal mining activities, using gas drainage systems, which are vertical wells or horizontal boreholes in advance of mining. ✓ CBM captures the methane from deep un-mined coal seams. CBM gas can be extracted by injecting water into the coal seam, displacing the methane and low pressure gas extraction. ✓ CBM exists where coal seams are at a depth of 250m to 900m, where coal and shales are capped by mudstones. ✓ Methane can be used for power generation, domestic cooking and heating. ✓ The gas has safety, environmental and economic benefits. ✓ CMM and CBM operations are taking place all over the world, including Australia, China, Ukraine and the USA.	✓ *EXR to review potential of recovering CMM using gas drainage systems at Highveld Mineand Ermelo mine to be developed.* ✓ *Review the CBM potential in the Mozambique coal tenements.*

Task 1.6 Key Success Factors for Junior Mining in Coal

Task	Area of investigation	Description	Matrices and Models
1.6	Key success factors	Determine key success factors for the JMC pertaining to corporate structure, resources, financing, mining, processing, engineering, infrastructure, suppliers, market, SHEQ, human resources and legal structures.	Matrix 1.6

The key success factors for EXR are those relating to coal junior mining:

Matrix 1.6 Key success factors for JMC - EXR

Corporate structure ✓ Simple company structure in place that will attract offshore funding	**Resources, geology and exploration** ✓ Resources and reserves that allow for a 5 - 10 year life of mine ✓ Simple geology, limited amount of dykes and faults ✓ Minimum coal quality criteria fulfilled: CV, % Ash, % sulphur % volatiles	**Mining** ✓ Ability to mine coal economically, ideally openpit ✓ Low stripping ratios ✓ Economics of scale possible
Processing ✓ Minimum yield can be achieved, taking coal washability into account ✓ Ability to process different coal products and sizes for different markets	**Engineering** ✓ Availability of mining equipment at least 80% ✓ Experienced engineering skills ✓ Availability of spares and tyres	**Infrastructure** ✓ Roads, water and electricity in close proximity to project ✓ Limited distance to market and cost of transport ✓ Critical infrastructure available: coal siding, rail, access to port
Suppliers ✓ Opportunity for contractor mining, processing and transportation. ✓ Strong partnerships with suppliers	**Market** ✓ Attractive coal off-take agreement in place ✓ Attractive market for coal	**Safety, health and environmental** ✓ Environmentally compliant operation ✓ Community support for venture ✓ Safe operation
Human resources ✓ Ability to attract and retain technical and operational talent ✓ Mining skills available ✓ Positive labour relations with workforce	**Legal** ✓ Security of tenure on mineral property guaranteed ✓ Compliance with BEE and mining legislation ✓ Contracts with defined scope of work and legally binding ✓ Strong contract management skills	**Finance** ✓ Ability to raise funding, mining finance network in place ✓ Project and operation with attractive NPV and IRR attractive to mining funds ✓ Availability of mining funds ✓ Operating costs managed cost effectively ✓ Sufficient contingencies in place to cover Capex deviations ✓ Stringent cashflow management

Implications for EXR:

With reference to key success factors, EXR features as follows:

- ✓ *Corporate structure: simple, caters for South African legislation*
- ✓ *Resources, geology and exploration: the company is short on resources and reserves*
- ✓ *Mining: mining methods applied at the Highveld Mine and Ermelo Project are simple openpit and underground mining. Nevertheless, the Highveld Mine is underperforming.*
- ✓ *Processing: EXR applies used and tested processing technology.*
- ✓ *Engineering: poor performance at the Highveld Mine is related to poor equipment availabilities.*
- ✓ *Infrastructure: EXR's mining assets in South Africa are in close proximity to infrastructure. The Mozambique tenements are remote.*
- ✓ *Suppliers: Supplier relationships at the Highveld Mine need to be improved. The Ermelo Project will outsource mining.*
- ✓ *Market: the coal market is attractive.*
- ✓ *Safety, health and environment: EXR has environmentally sound operations and projects and community support.*
- ✓ *Human resources: the shortage of engineering skills is affecting the performance of the Highveld Mine.*
- ✓ *Legal: EXR's tenements are secured, the company complies with BEE legislation, contracts are sound.*
- ✓ *Finance: EXR needs to raise capital to develop its portfolio. The profitability of the Highveld Mine needs to be improved.*

Task 1.7 Opportunities in the Coal Mining Sector

Task	Area of investigation	Description	Matrices and Models
1.7	Opportunities	Listing of local and international opportunities for the applicable resources sector.	Matrix 1.7i) Matrix 1.7ii)

Matrix 1.7i) Local mining opportunities – coal mining opportunities in South Africa [111]

Area	Description	Implications for EXR: Industry opportunities
Joint venture with major mining companies	South Africa's major coal miners have mined out the easily mineable coal and have reserves in the Witbank coalfield that can be mined profitably by junior coal miners with lower overheads and smaller, more flexible equipment	*Identify and purchase coal properties from majors, develop these into medium sized collieries with off-take agreements with major miners*
Farm-in into coal mining properties held by BEE consortiums	Many BEE consortiums have secured coal properties that need to be developed and require technical expertise	*Link up with BEE players and provide technical mine development expertise in exchange for equity in projects.*
Feasibility study of potential Waterberg coal projects	The Waterberg is the largest remaining coal field in South Africa and will be mined once the Witbank coal field is complete.	*Identify reserves in the Waterberg not taken by Exxaro Coal with the potential for a feasibility study for a mega mine development, to be joint ventured with a major mining company.*
Mining of remnant pillars in the Witbank coal field	Underground coal mine reserves have been mined out using an old, conservative pillar extraction formula. The new formula allows for these pillars to be mined out.	*Identify and acquire old underground workings with the potential for pillar extraction. Link up with mining contractor to extract these.*

Matrix 1.7ii) International mining opportunities – coal mining opportunities in Southern Africa

Area	Description	Implications for EXR: Industry opportunities
Botswana – coal bed methane venture: (110)	Botswana has deep level coal reserves (300 – 800m) that have the potential for coal bed methane extraction.	*Acquire coal bed methane property, link up with US suppliers and experts, raise capital and develop natural gas wells producing energy to be linked up to local electricity grid.*
Zambia: investment into state-owned coal mine (107)	Investment into state owned colliery Maamba Colliery: Capital investment into new machinery, restructuring of labour force, extensive use of mining and processing contractors.	*Re-engineer colliery to provide efficient and constant feed to emerging Zambian copper producers.*
Mozambique: exploration (1112)	Acquire or farm- in into the licences adjacent to CVRD's Moatize project in the Tete province and commence exploration and feasibility studies.	*Develop project to feed the mega-mine to be developed by CVRD.*
Nigeria: purchase of state-owned coal properties: (88)	Nigeria is selling its state owned coal mining and exploration assets.	*Purchase and develop West African coal mining operations.*

Task 1.7 PEST Analysis for EXR

Task	Area of investigation	Description	Matrices and Models
1.8	PEST analysis	An analysis of political, economic, socio cultural and technical (PEST) environments.	Matrix 1.8

Matrix 1.8 Pest analysis

Political future ✓ The impact of the new Mine Development Act in SA is opening up new opportunities for BEE mining companies, but hampering investments from offshore into South African ventures as SA is perceived to be 'risky'. ✓ Increasing political pressure on the South African government and related utilities to reduce greenhouse gases. ✓ South Africa's leading party is experiencing a leadership struggle between President Mbeki and the populist politician Jacob Zuma. ✓ Conflicts in Africa are diminishing and many countries are embracing free elections. ✓ Chinese invasion: Chinese companies are partnering with African governments to secure minerals for China in return for trade agreements and financial aid. ✓ Relationships between SA's government and mining companies is often poor, with poor permitting procedures, pressure to comply with BEE codes, and Ministerial discretion.	**Economic future** ✓ Chinese and Indian industrial expansion have resulted in a commodities boom and various mining funding opportunities are available for global mining ventures, less so for SA mining ventures. ✓ Fluctuating R/$ exchange rate ✓ The Witbank coal field is depleting and massive coal mining investments are becoming economically unviable – the future is small to medium sized operations. ✓ SA: High transportation costs and infrastructure bottlenecks ✓ BEE favours politically connected black elite for mining ventures. ✓ Massive demand for coal from Asian economies as a result of economic expansion. China is building 1 Eskom equivalent utility once every 3 years. ✓ Shortage of energy in SA: Eskom has to invest in coal mines in the short-term – coal offtake prices will increase ✓ Global mining skills shortage – staff and labour force becoming more expensive. ✓ Shortage of construction materials and tyres increases mining costs
Socio-cultural future ✓ New emerging black middle class in SA requires more energy and consumer goods. ✓ High drive to reduce unemployment and create jobs in SA. ✓ Mining companies forced to address social and sustainability issues when developing new projects ✓ Black economic empowerment is key to successful business in SA. ✓ SA has a very high HIV/AIDS infection rate, which affects mining companies' labour forces. ✓ Environmental pressure groups forcing European governments to move into alternative energy and reduce reliance on fossil fuels in an effort to reduce carbon emissions.	**Technological future** ✓ Coal producers are under pressure to produce cleaner coal and implement clean coal technologies. Extensive research in various clean coal technologies in the US and Europe. ✓ New uses for coal are being researched and implemented. Coal to liquids, hydrogen from coal ✓ New coal extraction methodologies are being investigated and piloted: underground coal gasification, natural gas winning from coal seams ✓ Massive efficiency improvements in openpit and underground coal mining: modular plants, satellite tracked production management systems.

Implications for EXR:

- ✓ *The coal junior mining company EXR is playing in an environment that is rapidly evolving.*
- ✓ *Politically, the future is governed by political uncertainties of South Africa, social pressures, the need to redress past imbalances through BEE, the opening up of opportunities in Africa and the growing dominance of China.*
- ✓ *The economic future is characterised by globalisation, a depleting Witbank coalfield, high transportation costs in South Africa, massive demand for coal from Asia, the shortage of energy, a capacity crunch and a skills shortage.*
- ✓ *The socio cultural future is characterised by the emergence of a black middle class in South Africa which requires more energy as it advances, the need for BEE and pressure to conserve the environment.*
- ✓ *Technological advances in clean coal will dominate this sector, as well as new coal extraction methodologies, and improved production efficiencies***.**

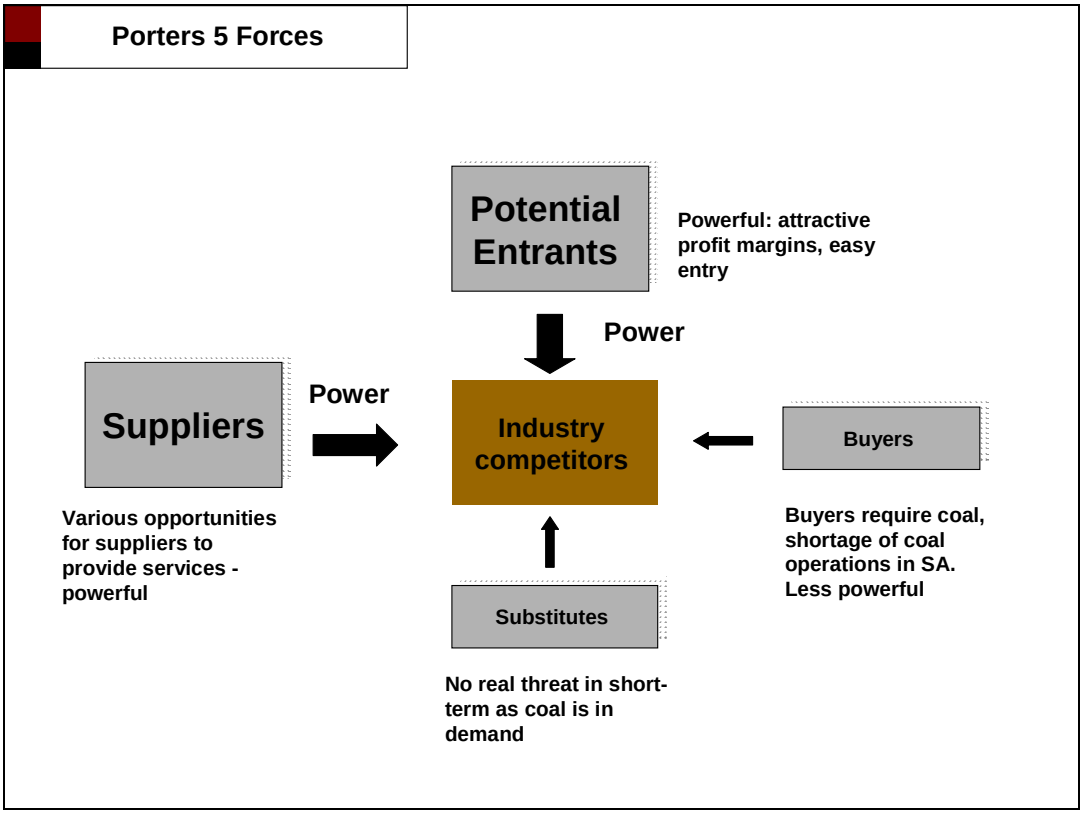
Task 1.9 Porters 5 Forces for Coal Junior Miners

Task	Area of investigation	Description	Matrices and Models
1.9	Porter 5 Forces	An analysis of the five forces interacting on the resources sector: suppliers, potential entrants, buyers, substitutes and industry competitors. Where does the power lie and what are the implications for the JMC?	Matrix 1.9 Model 1.9

Matrix 1.9 Porters 5 Forces for EXR

Potential Entrants ✓ There are many new BEE junior coal mining players. ✓ The barriers to entry for BEE players are low due to favorable government policies. ✓ New coal mega mines are being developed in Botswana. ✓ Australian junior miners players are entering the South African coal market, e.g. Riversdale.	**Suppliers** ✓ Mining contractors are exerting cost increase pressures as a result of shortage of tyres, steel, construction materials and skills.
Substitutes ✓ Alternative energy sources for coal and fossil fuels are actively sought by various governments and industry sources in order to reduce the impact of global warming. However, currently, alternative energy substitutes cannot compete commercially with coal. ✓ Alternatives to coal generated energy are wind energy, solar energy and nuclear energy. ✓ Alternatives to coal mining are underground coal gasification and natural gas extraction from coal.	**Buyers** ✓ On the international front, there is a huge demand for coal from energy hungry China and India. ✓ In South Africa there is a massive demand for coal from utility Eskom to meet growing energy consumption. ✓ Clean coal technologies require coal.
Industry Competitors to EXR ✓ The competitors to EXR are coal junior mining companies listed on the TSX, ASX and AIM stock exchanges, who have access to mining capital and a global focus ✓ In South Africa, established BEE players in the coal mining game are competitors.	

Model 1.9 Porters 5 forces for EXR



Implications for EXR:

- ✓ *The forces applicable to the coal junior mining sector lie with suppliers and potential entrants, as there is a huge demand for coal.*
- ✓ *Substitutes cannot compete yet with coal. The demand for energy has resulted in buyers competing for coal. The power of substitutes is currently low.*

Task 1.10 EXR Company SWOT

Task	Area of investigation	Description	Matrices and Models
1.10	Company SWOT	Determine strengths and weaknesses, opportunities and threats for the JMC.	Matrix 1.10 Model 1.10

The SWOT analysis is an integration and summary of the coal business dynamics with specific reference to EXR.

Matrix 1.10 Company SWOT - EXR

EXR Strengths ✓ EXR is a junior mining company with capacity, skills and equipment that can be readily deployed. ✓ The company has a three year track record in coal mining operations ✓ The EXR mining asset portfolio is diverse: thermal coal, (generating cashflow) to high grade metallurgical coal, as well as the potential for coal bed methane. ✓ EXR has access to international mining finance networks. ✓ The company is tactically flexible to mine remnant coal in the Witbank coal field at a profit.	**EXR Weaknesses** ✓ EXR is not pursuing opportunities up the coal value chain ✓ The Highveld Mine is marginal due to low R/t sales prices received from Eskom ✓ The high grade Mozambique project has a long lead time to development and is dependant on CVRD project to proceed ✓ EXR's existing operations are Rand based and have exposure to currency risk
EXR Opportunities **Local** ✓ Identify and purchase coal properties from majors, develop these into medium sized collieries with off-take agreements with major miners ✓ Link up with BEE players and provide technical mine development expertise in exchange for equity in projects. ✓ Identify reserves in the Waterberg not taken by Exxaro Coal with the potential for a feasibility for a mega mine development, to be joint ventured with a major mining company. ✓ Identify and acquire old underground workings with the potential for pillar extraction. Link up with mining contractor to extract these. **International** ✓ Acquire coal bed methane property, link up with US suppliers and experts, raise capital and develop natural gas wells producing energy to be linked up to local electricity grid. ✓ Re-engineer colliery to provide efficient and constant feed to emerging Zambian copper producers. ✓ Develop project to feed the mega-mine to be developed by CVRD. ✓ Purchase and develop coal mines in West Africa	**EXR Threats** ✓ Like EXR, many BEE junior coal miners and property rights traders are entering the coal game and acquiring reserves and resources. ✓ There is a shortage of mining and engineering skills. ✓ Global warming may result in a move away from traditional fossil fuel to alternative sources of fuel in the long term ✓ It is difficult for EXR to penetrate the existing RBCT shareholding structure without correct BEE shareholding. ✓ The deteriorating infrastructure in South Africa will increase the coal transportation costs from the mine to the port.

Step 2. Strategy Development for EXR

Having undertaken a detailed business review of the coal sector and determined implications for EXR, the next step is the development of a strategy for EXR in Step 2. These are:

- ✓ Task 2.1: Vision mission and objectives
- ✓ Task 2.2: Strategic options
- ✓ Task 2.3: Strategy selection

Task 2.1 Vision, Mission and Objectives

Task	Area of investigation	Description	Matrices and Models
2.1	Vision, mission and objectives	Vision, mission and objectives of JMC defined, based on market opportunities.	Matrix 2.1

The vision, mission and objectives of EXR are listed in Matrix 2.1. The relevant database is Table 4.22 (Strategies of Top Junior Mining Companies).

Matrix 2.1 Vision, mission and objectives - EXR

Vision	✓ The vision of EXR is to become a successful a mid-tier coal producer and developer in Sub Saharan Africa, bringing into account thermal, anthracite and clean coal mining projects in sub-Saharan Africa, thereby contributing to shareholder value and the powering of Africa's growing economies.
Mission	✓ Build shareholders value through the development of coal resource opportunities in sub-Saharan Africa ✓ Develop the coal resource potential in SADEC economies to power Africa's and Asia's growing economies. ✓ Produce cash flow from existing operations to enable further development of coal resources in SADEC and maximize shareholder returns.
Objectives	✓ Increase the life of mine of the Highveld Mine by increasing mineable reserves by a further 50 Mt by 2009. ✓ Bring the Ermelo Coal Project into production by 2010. ✓ Fast track exploration in Mozambique and establish the extent of the resource base. ✓ Investigate the potential for coal bed methane extraction in Mozambique through strategic alliance with natural gas companies.

Task 2.2 Development of Strategic Options for EXR

Task	Area of investigation	Description	Matrices and Models
2.2	Strategic options	Strategic options for the JMC developed, in alignment with industry analysis and company SWOT. Strategies defined for expansion, diversification, cost reduction, differentiation, focus and new market opportunities.	Matrix 2.2

The database for strategic options development is EXR SWOT, as well as the review of the strategies of the 20 listed junior mining companies.

Gameplan Database

Strategies of international listed junior mining companies:

- ✓ Expansion in the in one area - Copperbelt
- ✓ Acquiring mines that are unsuitable for major miners
- ✓ Developing a significant resource base in the DRC: Banro
- ✓ Focusing solely on the successful execution of one project
- ✓ Creating an active pipeline across the entire mine project value chain
- ✓ Decentralized management of diverse assets, with rigid cost control and operational leanness
- ✓ Disposal of non core asset and using proceeds to acquire a new mine
- ✓ Staged development, using cashflow to finance new ventures

Taking the database into account, as well as a facilitated workshop session with the company's directors, the following concrete strategic options were developed with regards to expansion, diversification, cost reduction, differentiation, focus and market:

Matrix 2.2 Strategic options - EXR

Strategy	Description
Expansion:	✓ Create large coal property portfolio through the acquisition and farm ins with BEE licence holders. Focus on quantity versus quality.
Diversification:	✓ Target multiple market segments, i.e. a portfolio of exploration, feasibility studies, mine development projects and mines. Also diversify portfolio from low grade thermal coal to high grade metallurgical coal mining ventures.
Cost reduction:	✓ Establish a profitable coal mine through cost reduction initiatives such as supplier collaboration and low overheads. ✓ Particular old Eskom mines, considered too costly by exiting major mining companies can be considered as an investment opportunity for profitability through cost cutting.
Differentiation:	✓ Focus on differentiating EXR from the rest of the coal junior mining companies. An example could be for EXR to create coal toll treating facilities for other coal junior miners to wash coal.
Focus:	✓ Segment the coal market, narrow it and target a specific sector. This could entail becoming an anthracite focused coal miner.
New market:	✓ Investigate and target new customers and markets. Opportunities include coal bed methane extraction projects in Mozambique.

Task 2.3 Strategy Selection - EXR

Task	Area of investigation	Description	Matrices and Models
2.3	Strategy selection	Strategic options ranked and selected for the JMC, based on consistency with mission, building on strengths, overcoming weakness, technical and financial feasibility, skills availability, acceptable risk and attractiveness to stakeholders.	Matrix 2.3

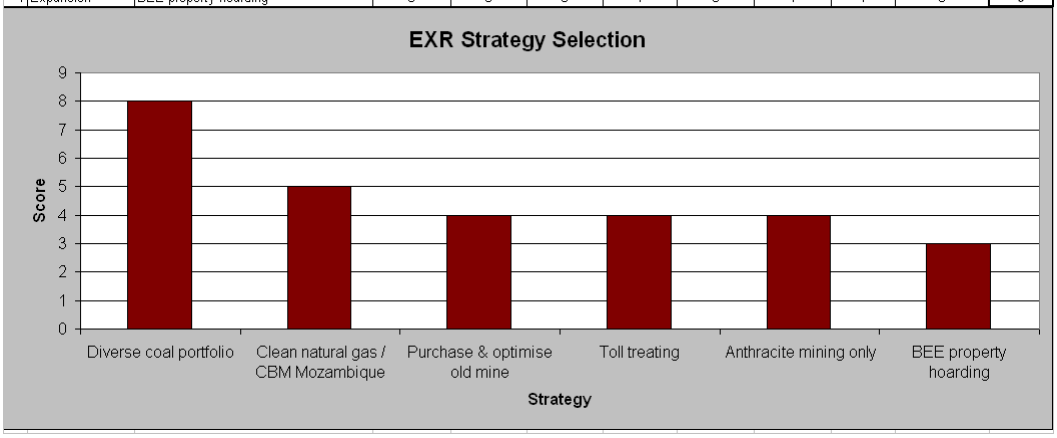
The most suitable strategy for EXR is determined using Matrix 2.3. This is a simple matrix, where the diversification, cost reduction, differentiation, focus and market strategies are ranked and selected for EXR, based on consistency with mission, building on strengths, overcoming weakness, technical and financial feasibility, skills availability, acceptable risk and attractiveness to stakeholders.

Matrix 2.3 Strategy selection - EXR

STRATEGY SELECTION PROCESS

VENTURE: EXR COAL COMPANY

#	Strategy	Stategy description	Consistent vision & Mission (yes = 1 no = 0)	Build on strengths (yes = 1 no = 0)	Overcome weakness (yes = 1 no = 0)	Feasible: technical (yes = 1 no = 0)	Feasible: financing (yes = 1 no = 0)	Feasible: skills (yes = 1 no = 0)	Acceptable risk (yes = 1 no = 0)	Attractive to stakeholders (yes = 1 no = 0)	Total
2	Divesification	Diverse coal portfolio	1	1	1	1	1	1	1	1	8
6	New market	Clean natural gas / CBM Mozambique	1	1	1	0	1	0	0	1	5
3	Cost reduction	Purchase & optimise old mine	0	1	1	1	0	1	0	0	4
4	Differentiation	Toll treating	1	0	1	0	1	0	0	1	4
5	Focus	Anthracite mining only	0	0	0	1	1	1	1	0	4
1	Expansion	BEE property hoarding	0	0	0	1	0	1	1	0	3



The results show that the top two strategies for EXR are **diversification** and entering **new markets.**

Step 3. Strategy Implementation - EXR

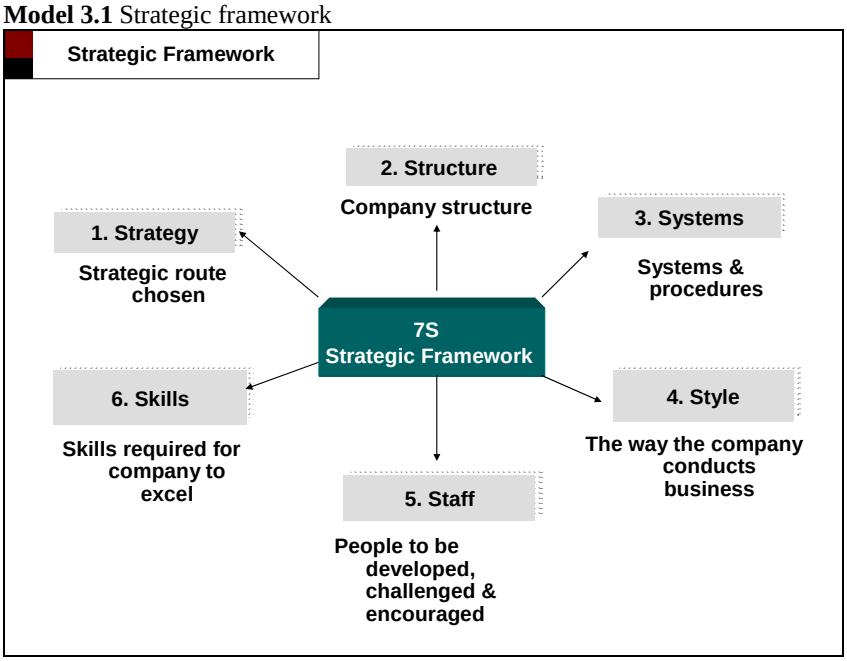
Now that diversification and entering new markets have been determined as key strategies for EXR, the next step is the expansion of these strategies with a view to creating a practical implementation plan in Step 3. This step entails the following tasks:

- ✓ Task 3.1: Strategic framework
- ✓ Task 3.2: Strategic staircase
- ✓ Task 3.3: Strategy implementation plan
- ✓ Task 3.4: Milestone chart

Task 3.1 Strategic framework

Task	Area of investigation	Description	Matrices and Models
3.1	Strategic framework	Development of a strategic framework which outlines the interaction of strategy, structure, systems, style, staff and skills.	Model 3.1 Matrix 3.1

Model 3.1 Strategic framework



The strategic framework for EXR, specifying strategy, structure, systems, style, staff and skills is outlined in Matrix 3.1.

Matrix 3.1 Strategic framework - EXR

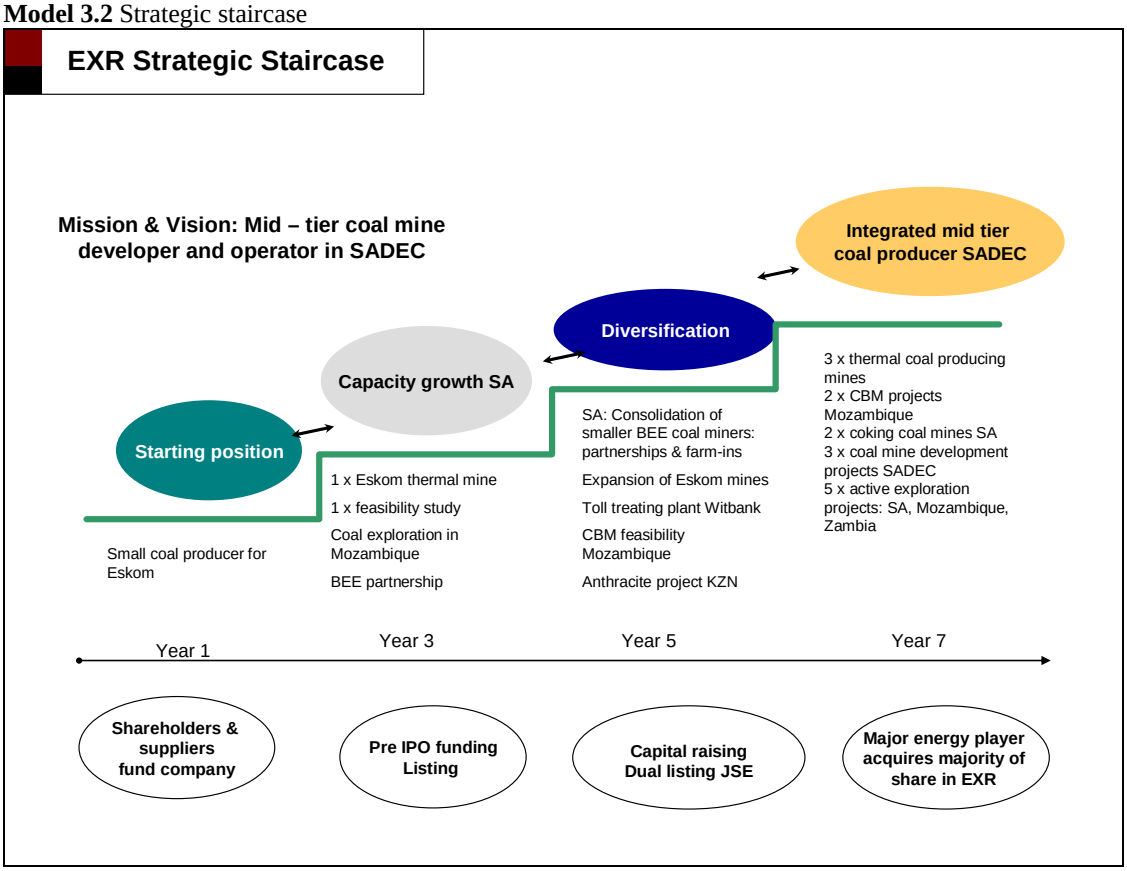
Strategy: ✓ EXR strategic route chosen: ✓ SADEC focused coal developer and miner ✓ Cashflow generator: Highveld Mine ✓ Feasibility: Ermelo Mine ✓ Coal and natural gas exploration: Mozambique ✓ Listing: offshore	**Structure** ✓ The corporate base of EXR is located in one of the global mining cities in close proximity to the capital markets. ✓ The operational companies are EXR South Africa and EXR Mozambique. ✓ At an operational level, EXR caters for BEE.	**Systems** ✓ The systems required to run an efficient junior mining company are: ✓ Mine planning software, production management system, maintenance management systems, financial management system, procurement systems, safety systems and HR payroll system.
Style ✓ The style of EXR is entrepreneurial, multicultural, non-bureaucratic, de-centralised, highly incentives, risk taking and rewarding.	**Staff:** ✓ The people to be developed, challenged and encouraged are the operational management team which includes the Managing Director, Mine Manager, VP Operations, VP Exploration and Financial Manager.	**Skills:** The skills required for EXR to excel are: ✓ Technical: geological and exploration, mining, processing, HR, environmental management, project development, operation s management ✓ Business development: marketing, investor relations ✓ Financial: capital raising, deal structuring

Task 3.2 Strategic Staircase - 7 year plan

Task	Area of investigation	Description	Matrices and Models
3.2	Strategic staircase - 7 year plan	Development of a strategic staircase which provides an overview for the major strategic steps in relation to a time line and provides a reference to capacities required.	Model 3.2

The strategic staircase for EXR is as follows:

Model 3.2 Strategic staircase



EXR's mission and vision is to become a mid - tier coal mine developer and operator in the SADEC region. The starting position of EXR in year 1 is that of a small coal producer, producing coal for Eskom. At this stage, the company is funded by shareholders and fleet is financed through suppliers backed finance.

The step of capacity growth in South Africa means growing the asset base to one Eskom thermal mine, one feasibility study and coal exploration projects in Mozambique. Key to the success are successful BEE partnerships and funding, provided by a pre-IPO campaign and a listing on a stock exchange in one of the mining capitals.

Diversification in year 5 entails consolidating the smaller BEE coal miners through partnerships and farm-ins, an expansion of the Eskom mines, establishing coal toll treatment facilities, starting a coal bed methane feasibility study and an anthracite project. Equity capital is raised through a dual listing in South Africa.

The target in year 7 is to have achieved the status of an integrated mid-tier coal producer in the SADEC region. To achieve this, EXR's mining asset portfolio should comprise 3 thermal coal producing mines, 2 coal bed methane projects in Mozambique, two coking coal mines in South Africa and five active exploration projects in South Africa, Mozambique and Zambia. At this stage, a major energy player would have acquired the majority stake in EXR.

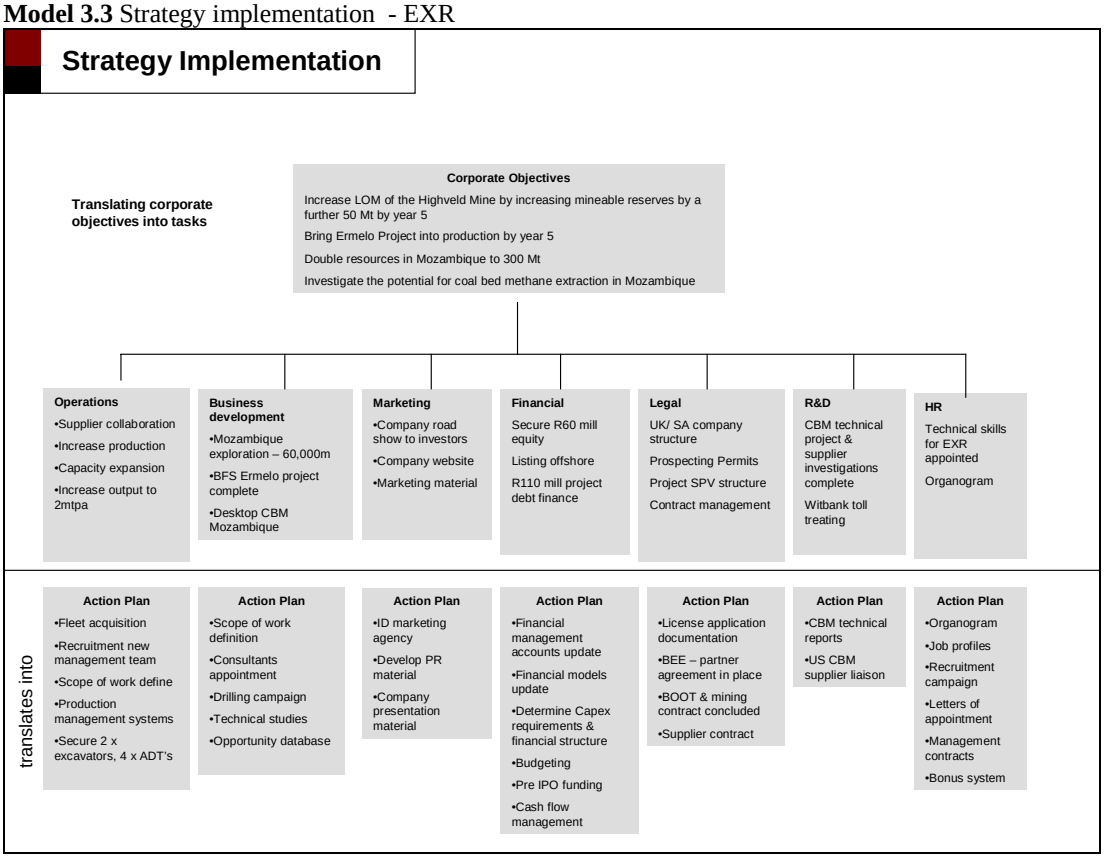
Task 3.3 Strategy implementation plan

Task	Area of investigation	Description	Matrices and Models
3.3	Strategy implementation plan	Presentation of an implementation plan that translates corporate objectives into tasks and action plans with reference to operations, business development, marketing, financial, legal, research and development and human resources.	Model 3.3

The strategy implementation plan for EXR is as follows:
The corporate objectives of EXR are to increase the life of mine of the Highveld Mine by increasing mineable reserves by a further 50 Mt by 2009, to bring the Ermelo Project into production by 2009, to double resources in Mozambique to 300 Mt and to investigate the potential for coal bed methane extraction in Mozambique.

In Model 3.3, these objectives are translated into operations, business development, marketing, financial, legal, research and development and HR objectives, which in turn are translated into action plans for each department.

Model 3.3 Strategy implementation - EXR



Task 3.4 Milestone chart- EXR

Task	Area of investigation	Description	Matrices and Models
3.4	Milestone chart	Development of a high-level milestone chart highlighting core activities and time lines for the team	Matrix 3.4 Model 3.4

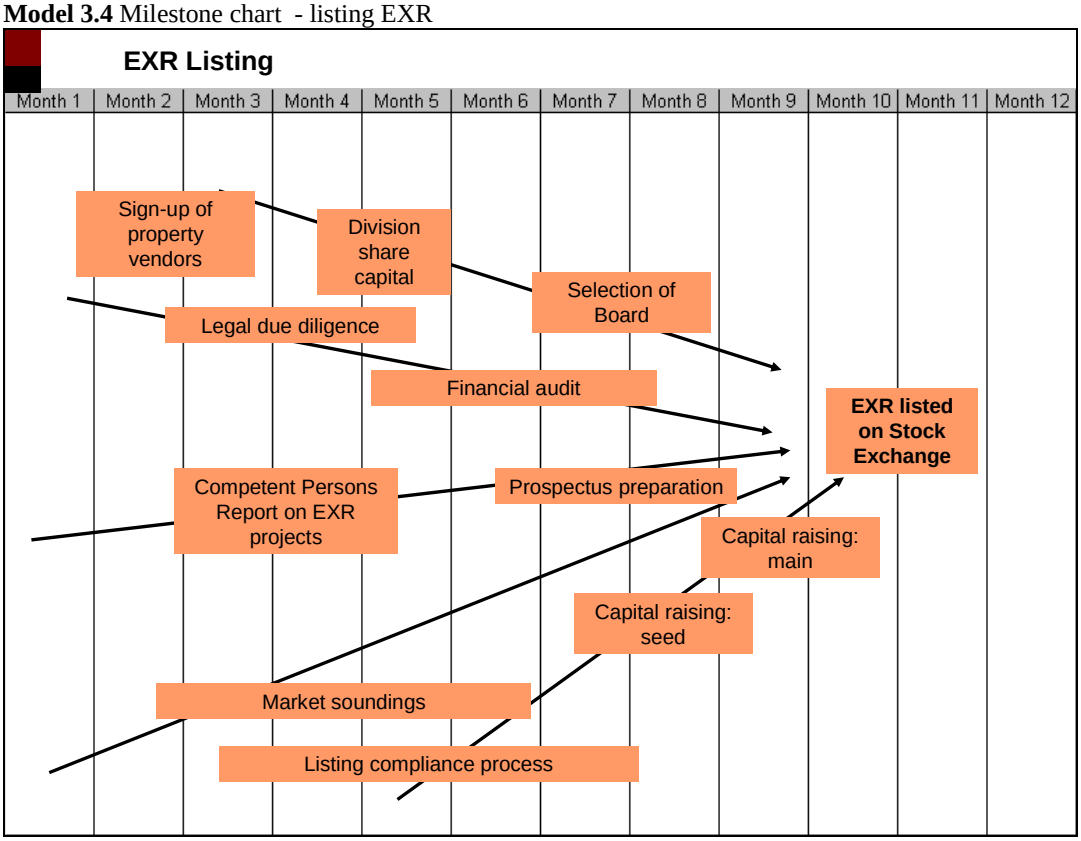
In year 3, a key milestone for EXR is the listing on an offshore stock exchange to raise capital for capacity growth. EXR is targeting to raise R50 mill. Milestones for a successful listing after 9 months are:

Matrix 3.4 Milestone chart activities – listing of EXR

Activity	EXR action plan
The signup of property vendors	The legal documentation relating to the Ermelo Project needs to be finalized. Complete ownership needs to be vested in EXR. All exploration properties in Mozambique need to be signed with an option to acquire 80%.
Competent Persons Report	The Competent Persons Report for the mining asset portfolio of EXR needs to be compiled by an independent, reputable, internationally recognized mining consultancy.
Division share capital	The share capital needs to be divided into the initial entrepreneurs, the market, and the brokers. The total number of shares needs to be determined and a share price set.
Legal due diligence	A legal due diligence needs to be conducted on all EXR contracts.
Financial audit	A financial audit needs to be concluded on EXR. Of particular relevance is the financial assessment of the marginal Highveld Mine.
Market soundings	Brokers will approach mining investors with a corporate summary of EXR to obtain a feel for the willingness of institutional and retail investors to invest into EXR.
Listing compliance process	Each stock exchange has different listing compliance procedures. In summary, they relate to corporate governance, disclosures, roles and responsibilities of directors. Brokers will ensure that EXR's board of directors is fully compliant.
Selection of board	A new board of directors will be appointed for EXR. There should be technical, financial and legal representation on the board, independence should be guaranteed and a position should be made available for a key investor.
Prospectus preparation	A detailed prospectus needs to be compiled on EXR, incorporating the findings of the Competent Persons Report and the financial and legal audit. The prospectus is used to attract investors to EXR.
Capital raising - seed	Prior to the listing, venture capitalists may want to provide initial seed capital to EXR.
Capital raising - main	All initiatives culminate in EXR being listed and raising at least R50 mill.
EXR listed on stock exchange	Once listed, EXR needs to comply to the reporting standards and rules and regulations set by the stock exchange.

These milestones are depicted in Model 3.4.

Model 3.4 Milestone chart - listing EXR



Summary: Strategy Development Pillar - EXR

The strategy development pillar has led to the development of a detailed strategy for EXR with an implementation plan, ready for execution.

The process commenced with Step 1, which entailed a business review. Here, the fundamentals of the coal market for an emerging coal junior mining company were highlighted from various angles. In summary, the coal market represents an attractive growing market for EXR, with the increasing demand for energy creating upward pressure for coal prices. Regionally, African countries, particularly Nigeria, Mozambique and Botswana present the opportunity for EXR to become an early entrant into this market, but the coal sector is sector is poorly developed and will require extensive investment in infrastructure. South Africa represents an established, mature industry with

a depleting coalfield which will open up opportunities for smaller BEE coal junior mining companies, increasing competition. EXR mining assets have been benchmarked against those of major and junior mining companies and EXR needs to increase its resource and reserve base, as the company lags behind its competitors in this area. The host countries of EXR's assets are South Africa and Mozambique. The increasing energy demand of South Africa will be beneficial to EXR, while the lack of infrastructure in Mozambique may result in EXR only being able to conduct feasibilities, rather than full mine construction. With regards to the global drive for clean coal, EXR, being a mine development company, can participate in the clean coal movement by investigating business opportunities in underground coal gasification and coal methane, as well as supplying coal to coal liquefaction giant SASOL.

Key success factors for the coal business have been defined. Several business opportunities have been outlined in the junior coal sector, such as partnering with major miners, farm ins, feasibility studies in the Waterberg, remnant pillar mining, coal bed methane ventures in Botswana, investment into state owned assets and exploration in Mozambique. The lack of skills and capacity will result in the power shifting towards the supplier. The last activity of the business review entailed incorporating all identified factors into the EXR company SWOT analysis.

The business review in Step 2 enabled precise vision, mission and objectives to be defined for EXR. From this, strategic options are defined, in terms of expansion, diversification, cost reduction, differentiation, focus and new markets. A simple strategy selection process was applied, which resulted in two key strategic drivers to be selected for EXR: diversification and new market.

In Step 3, the selected strategy is expanded upon in the strategic framework, a seven year plan, a detailed implementation plan and a milestone chart, for the most important task ahead of the team, which is raising of capital through a listing campaign.

5.5.2 Legal and Financial Pillar

The legal and financial pillar entails an analysis of legal structuring, financing and financial management of EXR.

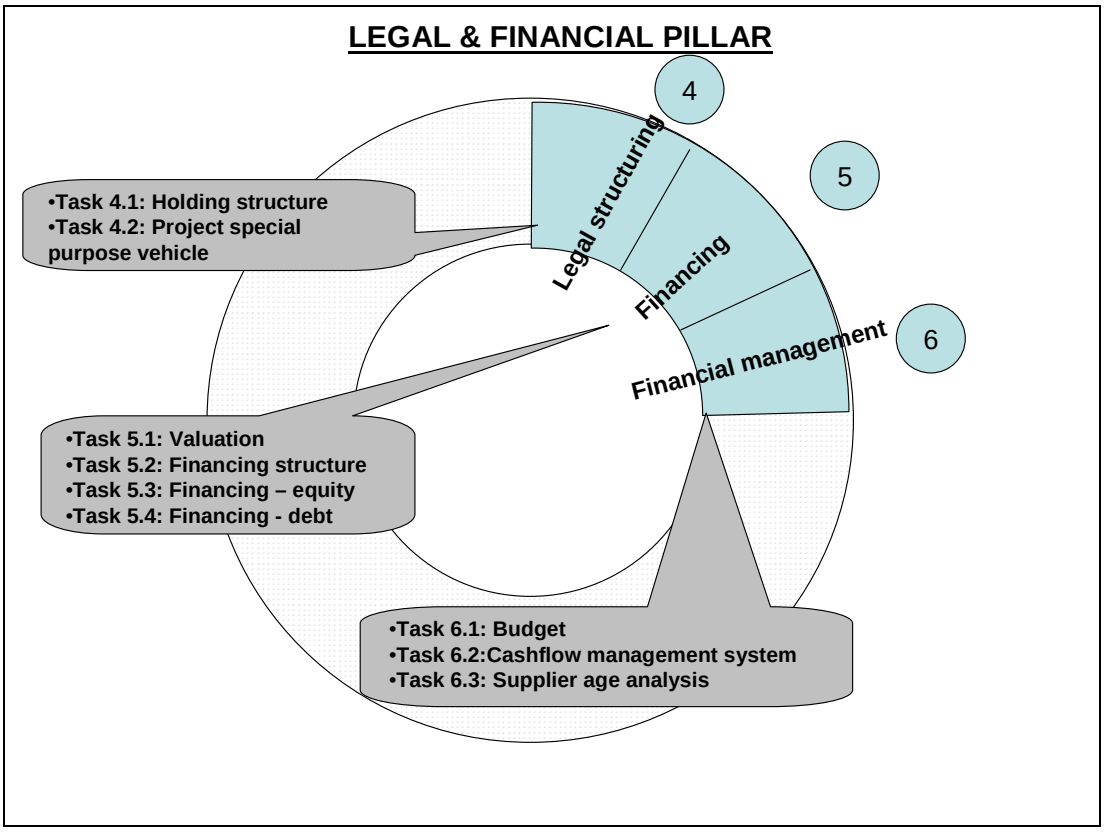


Figure 5.12. EXR legal and financial pillar

Step 4. Legal Structuring

Step 4 comprises 2 tasks. These are:

- Task 4.1: Holding structure
- Task 4.2: Project special purpose vehicle

Task 4.1 Holding Structure

Task	Area of investigation	Description	Matrixes & Models
4.1	Holding structure	Development of optimal holding and operational for JMC, which will facilitate funding, participation of investors at various levels, BEE and shareholder value.	Model 4.1

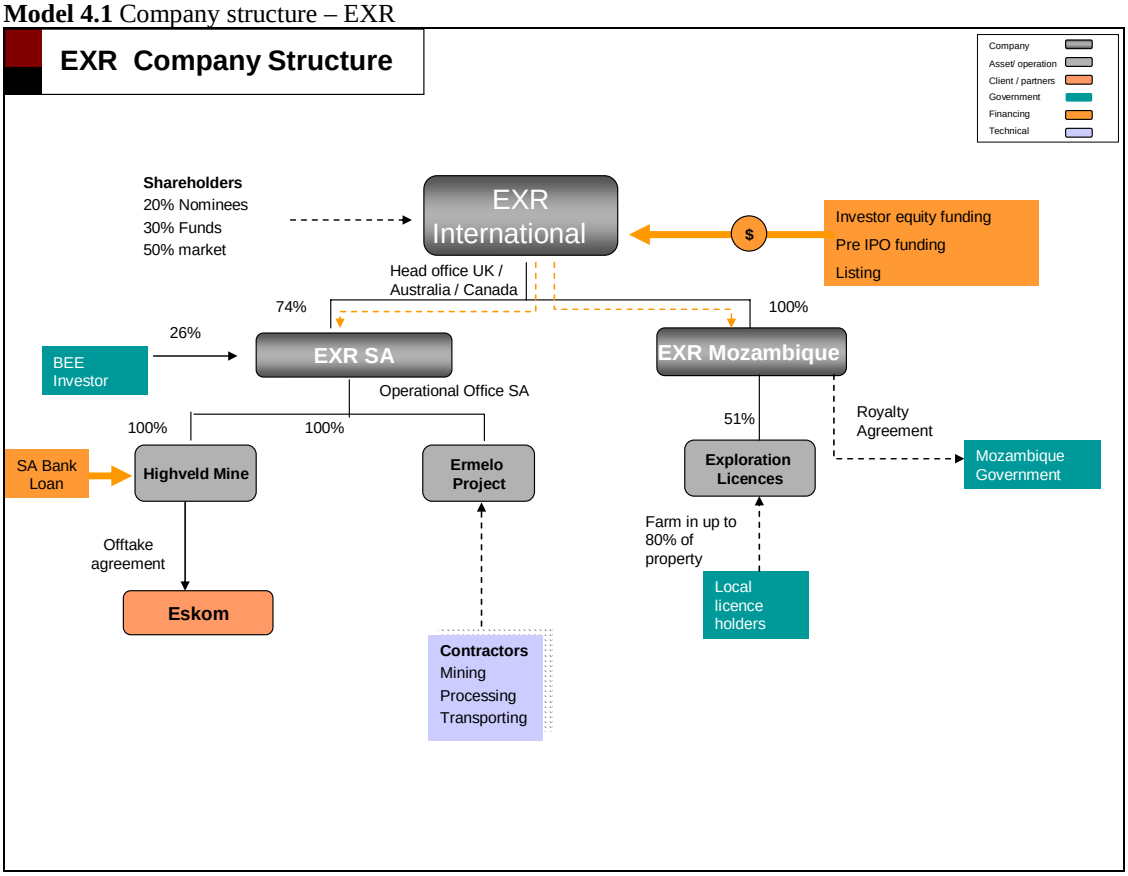
The holding structure of EXR has been developed to a structure that will facilitate capital injection into EXR, as well as shareholding opportunities for BEE investors at a South African operational level.

Gameplan Database

Database: Deal Structuring

- ✓ An analysis of the deal structuring of the companies Equinox, Adastra and Randgold Resources was provided is Chapter 4.
- ✓ Key elements to the deal are the corporate structure, the mining assets, legal issues such as shareholding, financing and the transaction partner.

Model 4.1 Company structure – EXR



Corporate structure: The holding company of EXR will be named EXR International and be located in one of the mining capitals, which is either in the UK, Canada or Australia, for the purpose of being close to mining financial institutions. The exact location will be determined by the stock exchange where EXR will be listed. EXR International will have two operational companies, EXR SA and EXR Mozambique, which will operate at a local, operational level. EXR International holds 74% of EXR SA. 26% of this company is held by a BEE investor, who is responsible for broad-based empowerment participation. EXR SA in turn is a 100% shareholder of two subsidiary companies which house the Highveld Mine and the Ermelo Project. In Mozambique, EXR Mozambique owns 51% of the exploration licences in a joint venture with a local property promotion business.

Mining assets: The mining assets are the Highveld Mine, the Ermelo Project and the exploration projects in Mozambique.

Legal: The Highveld Mine has an offtake agreement with Eskom. It is envisaged that the Ermelo Project which is to be developed will be appointing contractors for the mining, processing and transportation of coal. The Mozambique exploration project is subject to a royalty payment to the local government. EXR has acquired 50% of the property and has the option to farm-in into 80% of the property by undertaking exploration and doing feasibility work.

Financing: Finance for the operational companies is secured by EXR International, whose main function is to liaise with financiers, secure pre-IPO funding and undertake the listing. The Highveld Mine has been funded through debt finance by a South African bank.

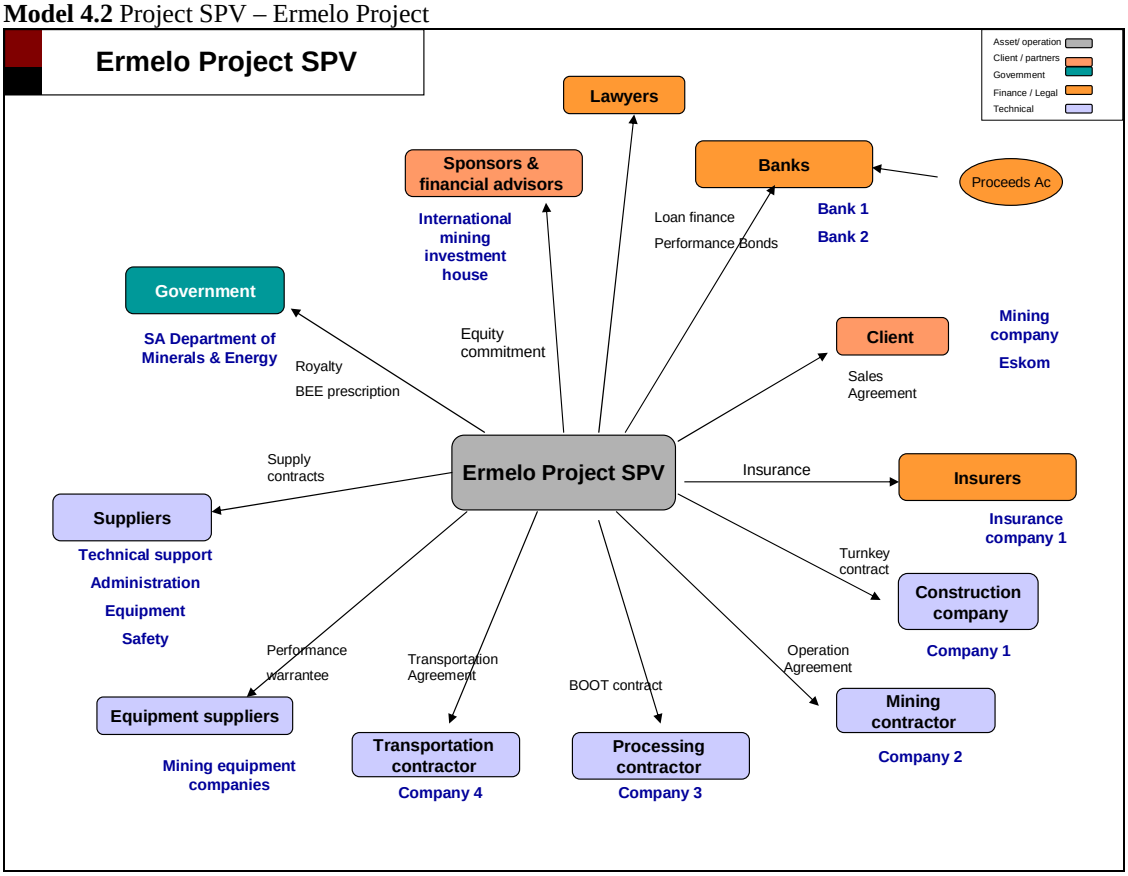
Transaction partner: The transaction partners of EXR to date have been Eskom, local BEE enterprises, a South African bank and offshore mining financiers.

Task 4.2 Project Special Purpose Vehicle

Task	Area of investigation	Description	Matrixes & Models
4.1	Project Special Purpose Vehicle	Project SPV for JMC's project set up in a manner that is clear and facilitates value. Outline project relationship to project sponsors, financiers, advisors, suppliers, equipment OEMs, the market, insurers, the host government.	Model 4.2

EXR International is in the process of setting up a project special purpose vehicle (Ermelo Project SPV) for the Ermelo Project. The project SPV is an independent company. The Ermelo project is at a feasibility stage, but it is expected to be developed within the 24 months.

Model 4.2 Project SPV – Ermelo Project



The relationship of the Ermelo SPV with the host government, the project sponsors, advisors and financiers, the client, the insurer, the construction company, contractors, and suppliers is as follows:

Host government: The Ermelo SPV has to prescribe to BEE mining legislation with regard to ownership. Also, the project needs to pay a royalty of 3% on profits, once operational.

Sponsors and financial advisors: These are companies that EXR relies on in terms of equity finance.

Banks: The bulk of the project is debt-financed. Two banks are providing a loan to the project with related performance bonds. The debt is serviced through operational revenue which is transferred into a proceeds account and managed by the financiers.

Client: The Ermelo project has two clients: The first client is a coal trading house in the UK. The second client is the power utility Eskom. EXR is in the process of signing sales agreements with both clients for the coal products.

Insurers: The project, the assets, the manpower and the coal under transportation are insured.

Construction company: A construction company is being awarded a turnkey contract for the establishment of the mine. This will entail the mining infrastructure and processing plant and the inclined shaft to establish access to the underground workings.

Mining contractor: The underground mining operations will be outsourced to a reputable underground mining contractor, with whom an Operation Agreement needs to be concluded.

Processing contractor: The coal processing will be outsourced to a coal processing company, who will build, own and operate the plant, which will ultimately be transferred to EXR.

Transportation contractor: A transportation contractor will be appointed to transport the washed coal product from the processing plant to the railway siding. A transportation contract needs to be concluded. An opportunity exists to appoint one of the many locally based BEE transportation companies.

Equipment suppliers: Certain equipment on the mine, such as front end loaders will be purchased, and be subject to performance warrantees. As the Ermelo Project has outsourced the mining, the mining fleet belongs to the mining contractor and not to EXR.

Suppliers: A host of suppliers is required for the successful day-to- day operation of the mine. These are suppliers related to administration, technical support, equipment and safety. With each supplier, supply contracts are concluded.

Step 5. Financing

Step 4 comprises four tasks. These are:

- Task 5.1: Valuation
- Task 5.2: Financing structure
- Task 5.3: Financing – equity
- Task 5.4: Financing - debt

Task 5.1 Valuation - EXR

Task	Area of investigation	Description	Matrixes & Models
5.1	Valuation	Company valuation process undertaken. The foundations are the project NPVs and comparable market transactions. Undertake 2 - 3 company valuations and average to determine company value. To be included are exploration costs, cash, equity, debt, surface stockpiles and overheads.	Matrix 5.1

The valuation of EXR is undertaken as follows: Firstly, the project values, that is, the project NPVs are determined. Next, comparable transactions are reviewed and applied to the mining assets of EXR. Thereafter, a valuation is undertaken by reviewing the sum of the NPVs, cash, the value of surface stockpiles, equity, corporate overheads and the debt. Finally, the average value is established to determine the value per share.

The valuation of EXR is displayed in Matrix 5.1 below:

Matrix 5.1 Company valuation

COMPANY VALUATION	Energy-X Resources		
1. Project Values			
Project	**Highveld Mine**	**Ermelo Project**	**Mozambique Exploration**
Synopsis	10 Mt reserve CV 20 MJ/kg Opencast 1.5 Mtpa Eskom mine Capex: R27 mill	20 Mt reserve CV 27 MJ/kg Ug mine 1. Mt pa Multiproduct Capex: R112 mill	Early stage exploration Coal & natural gas 47,000 ha concessions 5 phase exploration programme Encouraging results
NPV (R mill)	6	91	2
2. Comparable transactions			
2.1 Market Offerings			
CV	Offer 1: R/t	Offer 2: R/t	
CV between 18 and 22MJ/kg	0.5	1	
CV between 22 and 26MJ/kg	1	2	
CV between 24 and 26MJ/kg	1.25	2.5	
CV above 26MJ/kg	1.5	3	
2.2 Offer 1 applied			
Project	tons (mill)	R/t	Value (R mill)
Highveld Mine	10	0.5	5
Ermelo Project	20	1.5	30
			35
2.3 Offer 2 applied			
Project	tons (mill)	R/t	Value (R mill)
Highveld Mine	10	1	10
Ermelo Project	20	3	60
			70
3. Valuation Methods NPV (12%) (R mill)			
Asset / debt	NPV method	Comparable transaction 1	Comparable transaction 2
Highveld Mine	6	5	10
Ermelo Project	91	30	60
Mozambique exploration	2	2	2
Cash	10	10	10
Surface stockpiles	0	0	0
Equity	30	30	30
Corporate overheads	-5	-5	-5
Total debt	-10	-10	-10
	124	62	97
4. Final Valuation (R mill)			
Average valuation (R mill)	**94**		
# shares (mill)	**100**		
share price (R/share)	**0.94**		

The process of valuing EXR is as follows:

i) Project Values

The NPVs for the Highveld Mine, Ermelo Project are determined at R6 mill and R91 mill respectively. The Mozambique exploration concessions have an ascribed value of R2 mill, due to a comparative assessment.

ii) Comparable transactions

Two market offerings for different coal qualities are provided. These market offerings are applied to the reserve base of EXR's Highveld Mine and Ermelo Project. Offer 1 ascribes a value of R35 mill to the assets. Offer 2 ascribes a value of R70 mill to the assets.

iii) Valuation

Three valuation methods are compared. The NPV method entails the sum of the NPVs, cash, the value of surface stockpiles, equity, corporate overheads and the debt. The value is R124 mill. The comparable transactions differ from the NPV method in that the NPV values are replaced by the values determined in step 2 for the respective mining assets. The value of EXR determined from the comparable transaction 1 is R62 million, the comparable transaction value 2 is R97 million.

iv) Final valuation

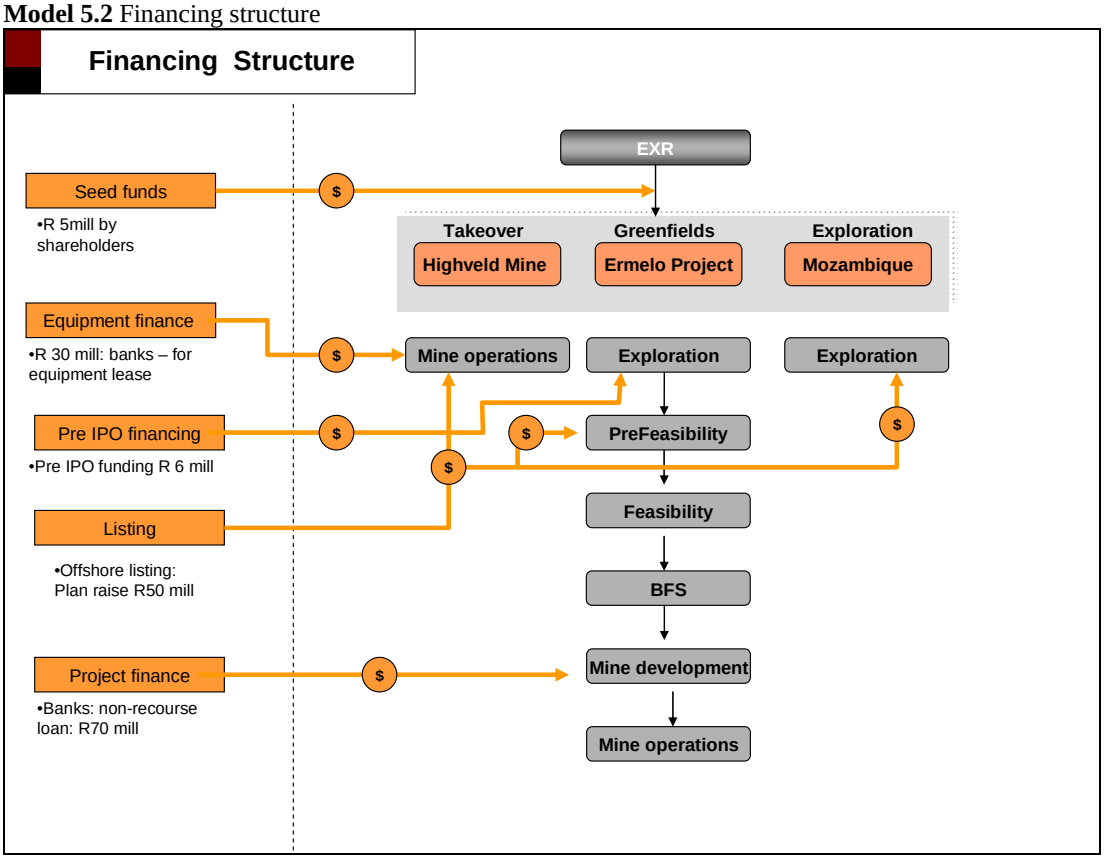
The average value of EXR is that average of the valuation methods, R94 million. The number of shares issued is 100 million. This corresponds to R0.94 / share.

Task 5.2 Financial Structuring

Task	Area of investigation	Description	Matrixes & Models
5.2	Financing structure	Company's financing clearly structured to cater for various project stages and facilitate ease of financing.	Model 5.2

EXR financing structure is displayed in Model 5.2. Displayed are seed funds, equipment finance, pre-IPO funding, listing and project finance.

Model 5.2 Financing structure



The financing structure of EXR is as follows:

Seed funds: The mining entrepreneurs who founded EXR provided seed funds to the value of R 5 million.

Equipment finance: EXR financed the fleet for the Highveld Mine by entering into an equipment finance arrangement with a major equipment supplier, to finance the mining fleet to a value of R 30 million.

Pre-IPO financing: Pre –IPO financing of R6 million was undertaken to acquire the Ermelo Project at a prefeasibility stage from a major mining company and to conduct a full feasibility study on the asset project.

Listing: EXR intends to list on an offshore mining stock exchange in order to raise R 50 million capital to complete the Ermelo Project feasibility study, re-finance debt of the Highveld Mine, and commence drilling on the Mozambique concessions.

Project finance: EXR will require a project finance facility of R70 million to develop and take the Ermelo Project into production.

Task 5.3 Financing Equity

Task	Area of investigation	Description	Matrixes & Models
5.3	Financing equity	Equity financing activities in place to secure risk capital for the JMC. Equity financing processes relating to the JMC listing on a stock exchange defined: Competent Person's Report, financial audit, legal audit, prospectus, marketing material. Company ready to pursue listing route.	Matrix 5.3

To date, EXR has raised R11 million through a seed capital and a pre-IPO capital raising campaign. The next equity raising activity is the listing of the company on a stock exchange with the intention of raising R50 million. Matrix 5.3 below outlines the equity financing activities.

Matrix 5.3 Equity financing - EXR

Date	Activity	Capital raised	Purpose	Process
Year -3	Issue of 5 million seed capital	R 5 million	✓ Proceeds used to provide seed capital into the EXR venture	✓ Shareholders to contribute according to shareholding
Year 1	Pre IPO seed financing	R 6 million	✓ Proceeds used to acquire the Ermelo Project pre-feasibility study and develop it into a feasibility study.	✓ Mandate to Nomad ✓ Market soundings ✓ Division of share capital ✓ Competent persons report concluded on Ermelo project ✓ Preliminary financial and legal audit undertaken ✓ Financiers offered 10 million shares @ 10c per share
Plan: Year 3	Listing on AIM: issue 50 million shares at R1/share	Plan: raise R50 million	R50 million to be used as follows: ✓ R15 million for payment of debt and working capital for the Highveld Mine ✓ R20 million for the bankable feasibility study of Ermelo Project ✓ R15 million to secure further tenements and commence with exploration campaign in Mozambique	✓ Competent persons report ✓ Legal due diligence report ✓ Financial audit report ✓ Tie-in of project vendors ✓ Due diligence exercise ✓ Payment of Admissions fees ✓ Prospectus preparation ✓ Roadshow to investors

Task 5.4 Financing Debt

Task	Area of investigation	Description	Matrixes & Models
5.4	Financing debt	Debt financing processes in place with repayment, interest, and general terms that facilitate company growth. Debt financing process understood.	Matrix 5.4

EXR started the Highveld Mine through a R30 mill equipment finance facility provided by South African banks. The financing of the Ermelo Mine development, after the completion of the bankable feasibility study will be undertaken through a project finance facility provided to the Ermelo Project Special Purpose Vehicle. Matrix 5.4 outlines the loans, institutions, interest, terms, and processes.

Matrix 5.4 Debt financing - EXR

Date	Loan	Institution	Interest	Terms	Process
Year 0	R30 million equipment finance	SA banks	Prime +1%	✓ 3 year term ✓ Guarantees by shareholders ✓ Pledge over proceeds received from sales of coal ✓ Equipment remains the asset of the bank until it is paid off ✓ Monthly payment: R3.1 million	✓ Approach banks for asset based finance ✓ Provide off take contracts ✓ Documentation: technical, legal, financial for credit committee
Plan: Year 3	R70million project finance	Consortium of commercial banks	Prime - 1%	✓ For the development establishment of Ermelo Coal Mine ✓ Loan to be collateralised over assets of the mine ✓ Payable over 10 years ✓ Annual repayment: R13 million	✓ Complete feasibility study of Ermelo project ✓ Secure Mining Licence ✓ Ermelo SPV structure established ✓ Due diligence ✓ Financing ✓ Completion tests

Step 6. Financial Management

Step 6 comprises three tasks:

- Task 6.1: Budget
- Task 6.2:Cashflow management system
- Task 6.3: Supplier age analysis

Task 6.1 Budget

Task	Area of investigation	Description	Matrixes & Models
6.1	Budget	Accurate, ambitious operational budget with realistic targets.	Matrix 6.1

A budget has been set for the Highveld Mine with realistic operational targets. As can be seen from the Matrix 6.1 below, the mine is marginal and is struggling to remain profitable due to low production performance.

The mine has a planned revenue target of R9.6 million. However, actual revenue is R8.6 million on average. Costs have not reduced correspondingly, with a plan of R8.9 million and an actual of R8.6 million. This results in an actual profit after head office costs of R0.1 million as opposed to a planned profit of R0.5 million. Clearly, the Highveld Mine is marginal, and can quickly turn into a loss making scenario.

Matrix 6.1 Budget Highveld Mine – EXR

HIGHVELD COAL MINE		BUDGET - PLAN VS ACTUAL		
1. INCOME				
Contract	Month UNIT	1		
		Plan	Act	Var
Coal Sales -power utility	tons	9,600,000	8,900,000	-700,000
TOTAL REVENUE	R	**9,600,000**	**8,900,000**	**-700,000**
2. EXPENSES				
Drilling	R	200,000	200,000	-
Blasting	R	300,000	300,000	-
Processing	R	1,900,000	1,900,000	-
Fuel	R	2,000,000	1,800,000	-200,000
Insurance	R	100,000	100,000	-
Equipment OEM 1	R	500,000	500,000	-
Equipment OEM 2	R	800,000	800,000	-
Equipment OEM 3	R	200,000	200,000	-
Earthmoving company 3	R	200,000	200,000	-
Earthmoving company 4	R	200,000	200,000	-
Earthmoving company 5	R	200,000	200,000	-
Maintenance	R	600,000	600,000	-
Light Vehicles (Fuel, Repairs, Reimbers)	R	50,000	50,000	-
Salaries + Wages: Supervision and labour	R	1,500,000	1,500,000	-
Consultants	R	10,000	10,000	-
Communications	R	25,000	25,000	-
Travel & Accommodation	R	45,000	45,000	-
Contingency Provision	R	80,000	0	-80,000
TOTAL EXPENSES	R	**8,910,000**	**8,630,000**	**-280,000**
3. PROFIT				
FREESTATE MINE PROFIT	R	**690,000**	**270,000**	**-420,000**
4. HEADOFFICE				
Rent	R	12000	12000	0
Electricity, Water & Services	R	1500	1500	0
Communication	R	12000	12000	0
Security	R	1000	1000	0
Salaries : Personnel	R	30000	30000	0
Salaries : Directors	R	100000	100000	0
Advertising	R	1000	1000	0
Promotions	R	1000	1000	0
Stationary	R	6000	6000	0
Subscription & professional	R	1500	1500	0
Consulting	R	2000	2000	0
General and other expenses	R	3000	3000	0
Travel	R	2000	2000	0
Entertainment	R	1000	1000	0
	R	**174,000**	**174,000**	-
5. EXR PROFIT				
	R	**516,000**	**96,000**	**-420,000**

Task 6.2 Cashflow Management System

Task	Area of investigation	Description	Matrixes & Models
6.2	Cashflow management system	Analysis of cash flows (inflows and outflows), to allow for proper management of cash in the business.	Matrix 6.2

As the Highveld Mine is marginal, cashflow management is vital to the success of the operation. The players need constantly to know the status of the cash flows of the operation, a key to the successful management of EXR. Matrix 6.2 is used to manage the cash flows of EXR. The month starting balance is R2 million. During the month, deductions occur for explosives, diesel, and various suppliers. On 9 February, the power utility pays R2.7 million for the coal produced, increasing the balance to R3.8 million. Again deductions occur and at the end of the month the balance in EXR's account is R3.7 million.

Matrix 6.2 Cashflow analysis sheet - EXR

HIGHVELD MINE		CASHFLOW ANALYSIS SHEET	
Date	**Supplier**	**February**	**Balance**
	Month starting balance		*2,000,000*
1-Feb	Explosives	-500,000	1,500,000
1-Feb	Diesel	-	1,500,000
1-Feb	Tyre company	-100,000	1,400,000
4-Feb	Engineering company	-60,000	1,340,000
4-Feb	Earthmoving company 3	-	1,340,000
	Drilling company	-100,000	1,240,000
4-Feb	Earthmoving company 2	-	1,240,000
	Earthmoving company 4	-50,000	1,190,000
	Mining equipment OEM	-50,000	1,140,000
	Transport company	-23,000	1,117,000
9-Feb	PAYMENT Utility	2,700,000	3,817,000
9-Feb	Lawyers	-	3,817,000
	Oil company	-	3,817,000
9-Feb	Consulting company	-	3,817,000
10-Feb	IT company	-20,000	3,797,000
9-Feb	Electrical company	-40,000	3,757,000
9-Feb	Mining equipment OEM	-	3,757,000
9-Feb	Insurance company	-10,000	3,747,000
15-Feb	Plant hire company	-	3,747,000
16-Feb	Mine planner	-20,000	3,727,000
17-Feb	Surveyor	-	3,727,000
18-Feb	Telecoms	-	3,727,000
19-Feb	Property lease company	-10,000	3,717,000
20-Feb	Marketing company	-	3,717,000
25-Feb	Air conditioners	-5,000	3,712,000
25-Feb	Hydraulic pipe company	-6,000	3,706,000
25-Feb	Sanitation	-	3,706,000
25-Feb	Oil	-5,000	3,701,000
25-Feb	Fire services		3,701,000
	Month end balance		**3,701,000**

Task 6.3 Supplier Age Analysis

Task	Area of investigation	Description	Matrixes & Models
6.3	Supplier age analysis	Analysis of JMC creditors for 120, 90, 60 and 30 days to provide overview of cash flow outflows.	Matrix 6..3

From the author's experience, management of suppliers is a key element to operational success. A junior mining company needs continuously to be aware of the status of the supplier age analysis, particularly when the asset is marginal. This simple Matrix will enable the player to communicate with suppliers, determine the extent of capital to be raised for operations optimisation, enable negotiations with suppliers and set financial targets for the mine. Ideally, all suppliers are paid in time. The challenge arises when a mine is negatively affected by poor production performance due to breakdowns or bad weather. The revenue drops but the costs remain. Matrix 6.3 is then used to manage suppliers and assess the status of what is due to creditors. In the example of the Highveld Mine, R10.9 million is due to creditors, based on the status of the current operations. 32% of the account is current and 51% of the account is at 30 days, as per the contracts with the suppliers. 12% of the accounts are at 60 days which is per agreements with more flexible suppliers. It is critical for the Highveld Mine to generate enough revenue to enable the company to be up to date with accounts.

Matrix 6.3 Supplier age analysis sheet - Highveld Mine

HIGHVELD MINE	SUPPLIER AGE ANALYSIS SHEET					
Supplier	120+ Days	NOV 90 Days	DEC 60 Days	JAN 30 Days	FEB Current	Total Due
Explosives		-	500,000	1,500,000	900,000	**2,900,000**
Diesel	-	-	-	1,500,000	2,000,000	**3,500,000**
Tyre company	-	-	100,000	1,000,000	-	**1,100,000**
Engineering company	-	-	60,000	200,000	100,000	**360,000**
Mining equipment OEM		-	300,000	300,000	100,000	**700,000**
Earthmoving company 3	-	-	-	250,000	50,000	**300,000**
Earthmoving company 1	-	-	-	150,000	150,000	**300,000**
Drilling company		-	100,000	100,000	50,000	**250,000**
Earthmoving company 2	-	-	-	160,000	80,000	**240,000**
Earthmoving company 4	-	-	50,000	100,000	50,000	**200,000**
Mining equipment OEM		20,000	50,000	20,000	-	**90,000**
Transport company		40,000	23,000	50,000	15,000	**128,000**
Earthmoving company		-	-	-	150,000	**150,000**
Lawyers		-	-	-	150,000	**150,000**
Oil company					100,000	**100,000**
Consulting company		50,000	-	10,000	10,000	**70,000**
IT company		9,000	-	10,000	10,000	**29,000**
Electrical company		-	20,000	40,000	-	**60,000**
Mining equipment OEM		5,000	40,000	10,000	-	**55,000**
Insurance company		-	-	55,000	-	**55,000**
Plant hire company		10,000	10,000	20,000	-	**40,000**
Mine planner		-	-	30,000	-	**30,000**
Surveyor		-	20,000	9,000		**29,000**
Telecoms		10,000			5,000	**15,000**
Property lease company			-	-	22,000	**22,000**
Marketing company		-	10,000	10,000	-	**20,000**
Air conditioners				5,000	-	**5,000**
Hydraulic pipe company		10,000	5,000	-	-	**15,000**
Sanitation		2,000	6,000	4,000	-	**12,000**
Oil		-	-	-	-	-
Fire services			5,000	-	-	**5,000**
TOTAL	-	**156,000**	**1,294,000**	**5,533,000**	**3,942,000**	**10,925,000**
PERCENTAGE :	**0%**	**1%**	**12%**	**51%**	**36%**	

Summary: Legal and Financial Pillar - EXR

The legal and financial pillar has led to the development of detailed legal, financing and financial management structures for EXR. These models and matrices are simple, yet highly effective in managing a junior mining company.

The holding structure of EXR was structured in a manner that will facilitate financing from one of the mining capitals, into the operational companies in South Africa and Mozambique. A special purpose vehicle was created for the Ermelo Coal Mine that will facilitate value and outline the relationship of the project sponsors, financiers, advisors, suppliers, equipment OEMs, the market, insurers, and the host government.

The company valuation process undertaken, based on an assessment of the project NPVs, comparable market transactions and the inclusion of exploration costs, cash, equity, debt, surface stockpiles and overheads yielded EXR to be valued at R94 million, or R0.94 / share.

To date EXR has been financed through seed capital of R5 million, an equipment finance facility of R30 million and a pre IPO financing initiative of R6 million. The company now needs to list on a stock exchange to raise R50 million. In order to bring the Ermelo Coal Mine into production, a project finance facility of R70 million needs to be secured.

At an operational level, that is, at the Highveld Mine, a budget was determined, a cashflow management system constructed and a supplier age analysis sheet provided. These are simple, yet vital tools for the effective management of a mine, particularly a marginal asset, such as the Highveld Mine.

5.3 Operations Management Pillar

The operations management pillar entails step 7: the development of an operations management system in order to measure the performance of the operation; step 8, optimizing the operation; and step 9, team management.

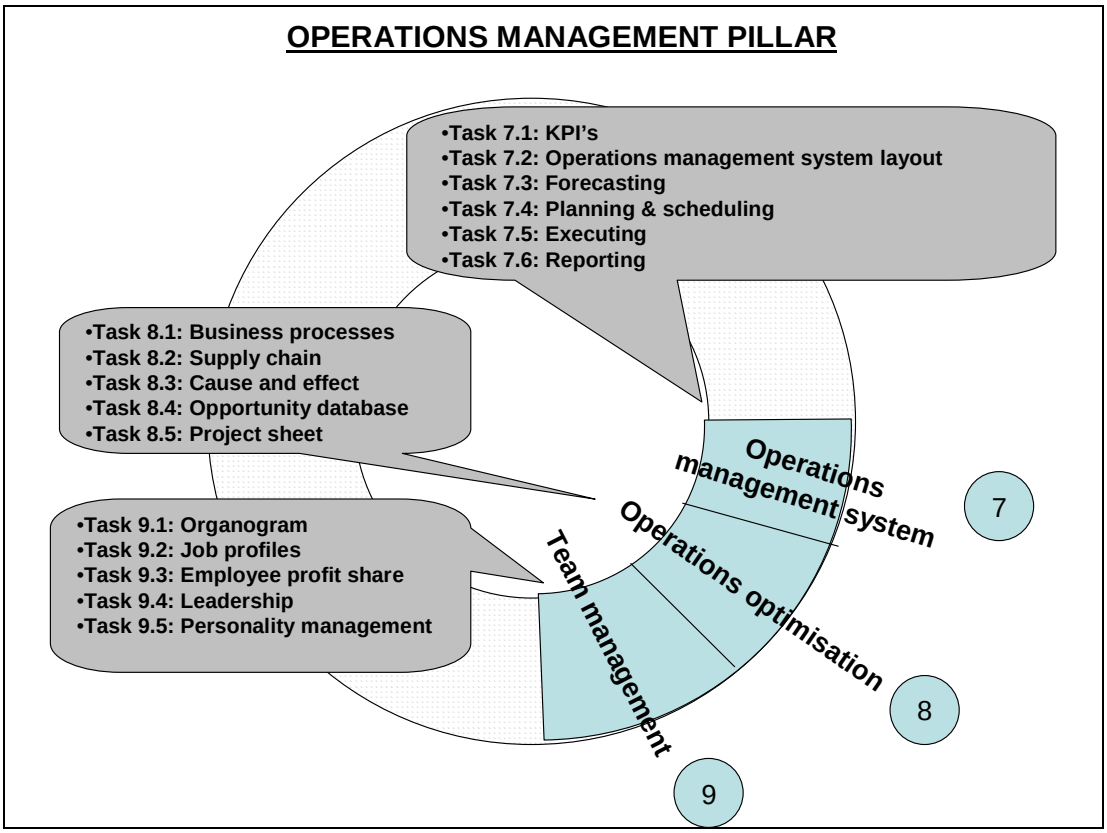


Figure 5.13 EXR operations management pillar

As the Highveld Mine is the only operation of EXR, this case study is played around this particular mining asset. Please refer to 5.4.1

Step 7. Operations Management System

The operations management system for EXR is built around the only asset of EXR, the Highveld Coal Mine. The purpose of the system is to measure performance with a view to improving the output of the mine. The same system needs to be developed for the Ermelo Coal Mine, once operational. Step 7 comprises 6 tasks. These are:

- Task 7.1: Key performance indicators (KPIs)
- Task 7.2: Operations management system layout
- Task 7.3: Forecasting
- Task 7.4: Planning & scheduling
- Task 7.5: Executing
- Task 7.6: Reporting

The database for this chapter is the OMS as defined in Chapter 3.1

Task 7.1 Key Performance Indicators

Task	Area of investigation	Description	Matrixes & Models
7.1	Key performance indicators (KPIs)	Have the operational KPIs for safety, mining, engineering, processing, transportation, quality, manpower been identified?	Matrix 7.1

The KPIs for the Highveld Mine are outlined in Matrix 7.1 for the mine's individual departments. The departments at the Highveld Mine are safety, mining, engineering, processing, transport, quality, manpower and finance.

With regards to safety, accidents, incidents and the cost of occurrence are important measurements. In mining, the key measurements relate to drilling, blasting, overburden removal, coal production, as well as important ratios such as ton / truck / shift and m3/ truck per shift. In engineering, key KPIs are equipment availabilities. In processing, coal crushed, the crusher availability and the coal inventory are important measurements. Key quality measurements are the CV, % ash, % volatiles and % sulphur. The manpower KPIs relate to control of employees and contractors, hours worked, overtime and

absentisms. Financial KPIs are controllable costs, i.e. costs which the mine's management can plan, control and manage. Matrix 7.1 outlines the KPIs per department, the Unit of Measure (UoM) and comments relating to the KPIs.

Matrix 7.1 Key performance indicators – EXR

KEY PERFORMANCE INDICATORS

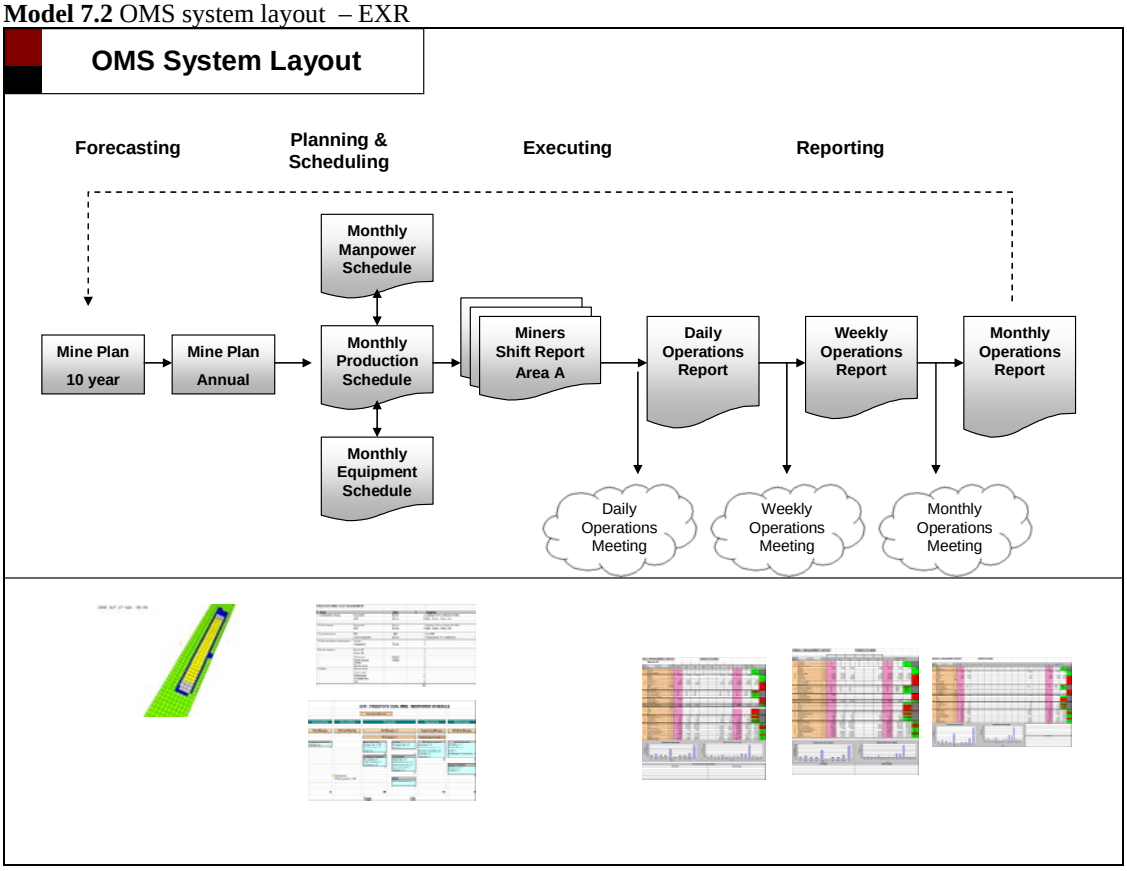
Dept	KPI	UoM	Comment
Safety	Accidents	#	Measurement of the number of accidents to keep to a minimum
	Incidents	#	Measurement of the number of incidents to track trends & avoid accidents
	Cost of occurrance	#	Measurement of the cost of accidents to personnel and equipment, as well as loss of production
Mining	Drilling	m	Measurement of m drilled
	Blasting	m3	Measurement of m3 blasted
	# loads	#	Loads are the simplest form of measurement in opencast mining
	OB Softs	m3	Overburdon softs is the material that is freely diggable
	OB hards	m3	Overburdon hards is the material that needs to be drilled & blasted
	Total waste	m3	The sum of overburdon softs and hards
	Coal	tons	The total coal mined, this is the Run-of-Mine tons
	Tons / truck/shift		An important ratio
	m3/ truck/ shift		An important ratio
Eng	ADT availability	%	The availability of trucks
	Excavator availability	%	The availability of excavators
	Dozer availability	%	The availability of the dozer
	Support fleet availability		The availability of the support fleet
Process	Coal crushed	tons	Measurement of the ROM crushed
	Crusher availability	%	The availability of the crusher
	Coal inventory	tons	The inventory of the coal stockpile to be transported to the power station
Trans	Coal loads to Eskom	tons	Measurement of tons of coal transported from the mine to the power station
Quality	CV	MJ/kg	Key coal quality measurement
	%Ash	%	Key coal quality measurement
	% Vol	%	Key coal quality measurement
	% S	%	Key coal quality measurement
Manpower	# People - inhouse	#	Measurement of the number of in-house employees
	# People(Contractors)	#	Measurement of the number of contractors
	Normal time	h	Measurement of the number of normal hours worked
	Overtime hours	h	Measurement of the number of overtime hours worked
	AWOP	#	Measurement of the abseentism
Controllable costs	Drilling & blasting	R	Measurement of the controllable costs
	Fuel	R	
	ADT maintenance	R	
	Excavator maintenance	R	
	Support fleet maintenance	R	
	Crusher maintenance	R	
	Drilling	R	
	Blasting	R	
	Equipment Rentals	R	

Task 7.2 Operations Management System (OMS) Layout

Task	Area of investigation	Description	Matrixes & Models
7.2	Operations Management System layout	Description of the operations management system layout in terms of forecasting, planning and scheduling, executing and reporting	Model 7.2

The OMS is the key management tool for the effective running of a mining operation. The system layout, which provides an overview of all the elements of the OMS is displayed for the Highveld Mine in Model 7.2. The elements of forecasting, planning and scheduling, executing and reporting are displayed, including a graphical display of the system elements.

Model 7.2 OMS system layout – EXR



In summary: The Highveld Mine has a 10 year life. This mine plan is broken down into an annual mine plan. The annual mine plan is broken down into a monthly production, equipment and manpower schedule. These schedules are used for the mining operations. At an operational level, the Mine's Shift Report is used to measure the performance of

the KPIs defined. Daily performance feedback is provided in the Daily Operations Meeting. The daily performance is summarized in the Daily Operations Report, to be used by the management team. The mine's performance is summarized in a Weekly Operations Report and a Monthly Operations Report. These are used for Exco meetings of the Highveld Mine, where the mine's monthly performance is measured. A loop exists back to the forecast, which is adjusted, taking the previous months performance into account. Tasks 7.3 to 7.5 will focus on the system elements of the OMS for the Highveld Mine.

Task 7.3 Forecasting

Task	Area of investigation	Description	Matrixes & Models
7.3	Forecasting	Development of 10 year and annual mine plans for the mining operation.	Matrix 7.3

The 10 year annual mine plan summary is displayed in the Matrix 7.3 As can be seen, the annual ROM tonnage ramps up from 800,000 tpa to 1.5 million tpa in year two. The product yield is 73%. Displayed are annual and monthly ROM and sales tonnages.

Matrix 7.3 Forecasting – EXR

	UoM	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
ROM	t	14,300,000	800,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Sized product 73% yield	Sales t	10,439,000	584,000	1,095,000	1,095,000	1,095,000	1,095,000	1,095,000	1,095,000	1,095,000	1,095,000	1,095,000
Monthly ROM production	tpm	1,191,667	66,667	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000
Monthly sales	Sales tpm	869,917	48,667	91,250	91,250	91,250	91,250	91,250	91,250	91,250	91,250	91,250

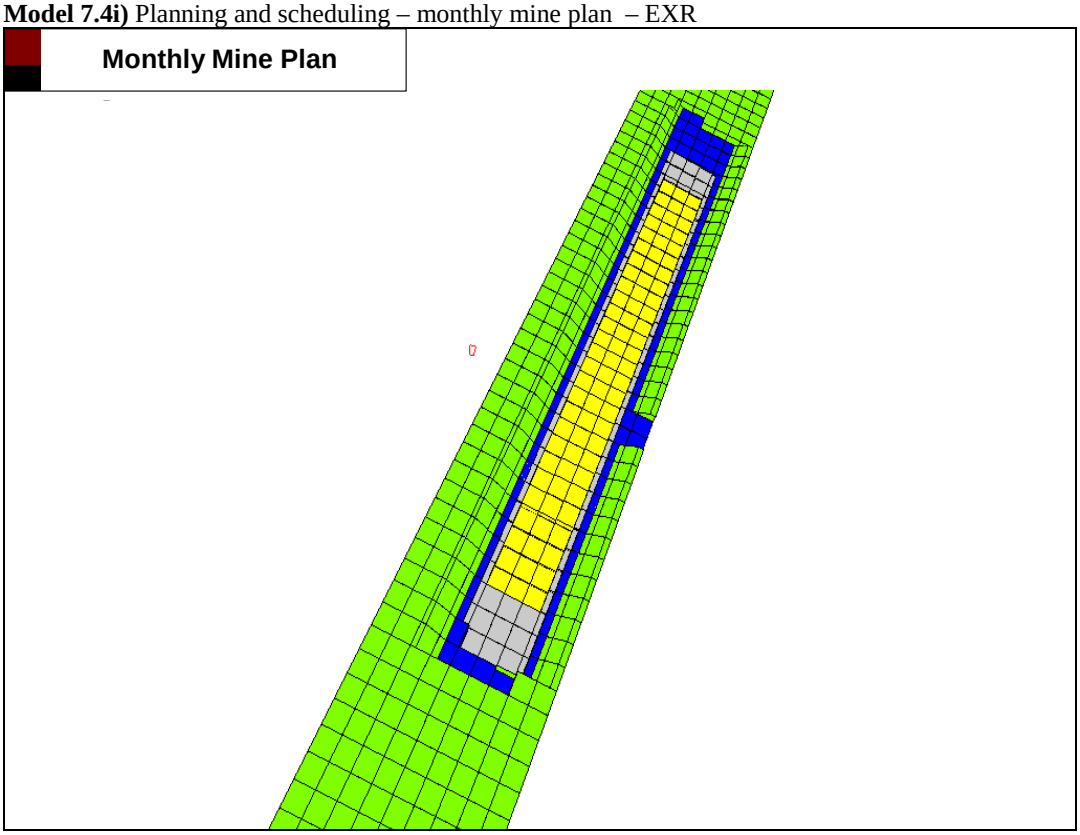
Task 7.4 Planning and Scheduling

Task	Area of investigation	Description	Matrixes & Models
7.4	Planning and Scheduling	Development of a monthly mine plan from which manpower and fleet are scheduled to meet the monthly mine plan.	Model 7.4i) Matrix 7.4ii) Matrix 7.4iii)

The 10 year annual mine plan is broken down into a monthly mine plan from which manpower and fleet are scheduled to meet the monthly mine plan at the Highveld Mine. The player needs to have a broad understanding of the production schedule, without going into too much detail.

Production schedule: The monthly mine plan, displaying the production schedule for opencast operations of the Highveld Mine is displayed graphically in Model 7.4i).

Model 7.4i) Planning and scheduling – monthly mine plan – EXR



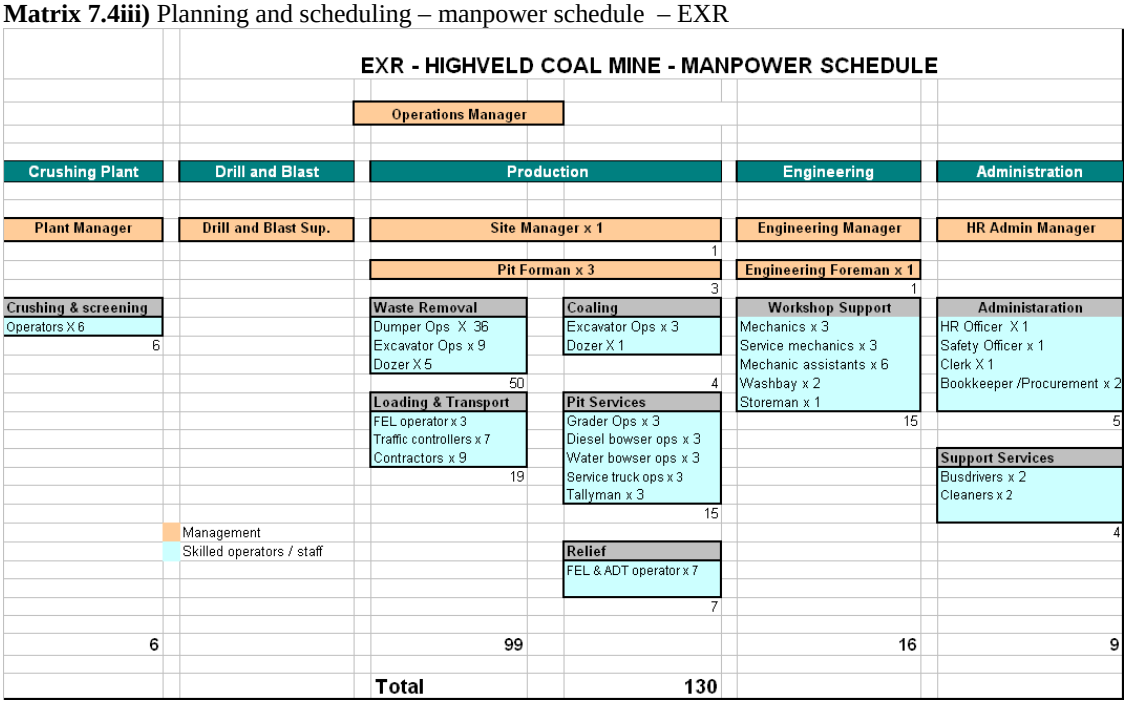
Equipment Schedule: In order to achieve the target of 125,000 tpm of coal at a stripping ratio of 2:1, the following fleet is required:

Matrix 7.4ii) Planning and scheduling – mine fleet – EXR

HIGHVELD MINE FLEET REQUIREMENT					
#	Area		Item	#	Supplier
1	Overburden mining	Excavator	85 ton	2	Liebherr 974 or Hitachi EX 850
		ADT	40 ton	8	Bell, Terrex, Volvo, Cat
2	Coal mining	Excavator	65 ton	1	Liebherr 974 or Hitachi EX 850
		ADT	30 ton	4	Bell, Terrex, Volvo, Cat
3	Coal transport	FEL	966	1	Cat 966
		Coal transporter	30 ton	1	Outsourced 4 x roadtrucks
4	Coal stockpile maintenance	Grader		1	
		Compactor	10 ton	1	
5	In pit services	Dozer D7		1	
		Dozer D9		1	
		Watercart	20000l	1	
		Diesel bowser	10000l	1	
		Grader		1	
		Service truck		1	
6	Other	Service truck		1	
		Crane truck		1	
		Waterpump		2	
		30 seater bus		1	
		LDV		4	
				34	

Manpower Schedule: A total of 130 people are required for the efficient running of the Highveld Mine. The manpower is scheduled according to the different disciplines on the mine.

Matrix 7.4iii) Planning and scheduling – manpower schedule – EXR



Task 7.5 Executing

Task	Area of investigation	Description	Matrixes & Models
7.5	Executing	Accurate reporting on key indicators at operational level to allow for action plans on a daily basis. Action plans are in place and discussed in daily review meetings.	Matrix 7.5

The Shift Report represents the executing component of the OMS. It is used by the opencast miner on shift on the Highveld Mine and provides an accurate sheet for the management of production, equipment and manpower. Plan versus actual are reported, and root causes for deviations provided. The sheet is used for the Daily Operations Meeting.

Matrix 7.5 Shift report – EXR

SHIFT REPORT

Miner:	G.Erasmus
Shift:	Day
Team:	A
Date:	6-Jun-03
Area:	Sect 1

PRODUCTION CONTROL						Codes	
KPI	UoM	Plan	Actual	Variance	Code		
Drilling	m	200	150	-50	a	a. Operator	g. Geology
Blasting	m3	4,000	5,000	1000		b. Standbye	h. Ramp buildinc
# loads	#	1,000	900	-100	c	c. Puncture	i. Breakdown
OB softs hards	m3	4,000	3,000	-1000	e	d. Abuse	j .Other
OB Softs	m3	4,000	5,000	1000		e. Weather	
Total waste	m3	8,000	8,000	0		f. Account	
Coal	**tons**	**4,166**	**3,500**	-666	h		

EQUIPMENT CONTROL					Codes	
Equipment	Type	Plan avail.	Availability.	Code		
Excavator	Liebherr	85%	99%		a. Eng	j. Elect
ADT 1	Bell	85%	85%		b. Trans.	k. P/maint
ADT 2	Bell	85%	76%	k	c. D/box	l. Other
ADT 3	Bell	85%	76%	k	d. Diff	m. U/carr
ADT 4	Bell	85%	76%	b	e. D/line	n. Bkt
Dozer	Bell	85%	70%	c	f. F/Drive	
Grader	Bell	80%	66%	d	g. Brakes	
Watercart	Bell	80%	66%	h	h. Steer.	
Diesel bowzer	Bell	80%	66%	i	i. Hyd.	

MANPOWER CONTROL						Codes	
Job category	H	Manpower #		Overtime			
		Plan	Actual	Hours	Code		
Miner	#	1	1			1. Abseentism	
Excavator operator	#	2	2			2. Vacation	
ADT operator	#	8	8			3. Housekeeping	
Dozer operator	#	1	1			4. Lateness	
Grader Operator	#	1	1			5. Training	
Watercart	#	1	1			6. Meeting	
Diesel bowzer operat	#	1	0			7. Sickness	
LHD Driver	#	3	2	1	4		
Total	Total	18	16	1			

Action Plan
1
2
3
4
5
6
7
8

Task 7.6 Reporting

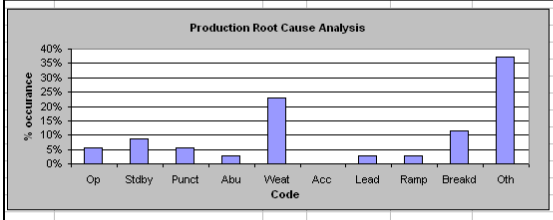
Task	Area of investigation	Description	Matrixes & Models
7.6	Reporting	Analytical information of JMC to allow proper monitoring of the operational performance. Plan versus actual and root causes for deviation presented.	Matrix 7.6

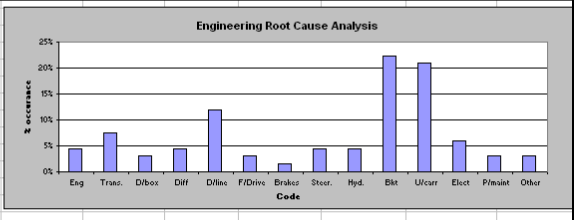
The results of the Shift Report are summarised in the Daily Management Report. The Daily Management report for the Highveld Mine is displayed in Matrix 7.6. The same report format is used for the monthly and annual operations report.

Matrix 7.6 Daily management report – EXR

DAILY MANAGEMENT REPORT — **HIGHVELD COAL MINE**

WE	6-Mar-05	UoM	Daily Plan	Mon	Tues	Wed	Thur	Fri	Sat	Weekly Analysis		
Dept	KPI									Plan	Act	Var
Safety	Accidents	#	0	0						0	0	0
	Incidents	#	0	0						0	0	0
	Cost of occurance	#	0	0						0	0	0
Mining	Drilling	m	200	150						1,200	150	-1,050
	Blasting	m3	4,000	5,000						24,000	5,000	
	# loads	#	1,000	900						6,000	900	
	OB softs hards	m3	4,000	3,000						24,000	3,000	-21,000
	OB Softs	m3	4,000	5,000						24,000	5,000	-19,000
	Total waste	m3	8,000	8,000						48,000	8,000	-40,000
	Coal	**tons**	**4,166**	**3,500**						24,996	**3,500**	
	m3/ truck/ shift		300	280						1,800	280	
Eng	ADT availability	%	85	76						85	76	-9
	Excavator availability	%	85	99						85	99	14
	Dozer availability	%	85	70						85	70	-15
	Support fleet availability		80	66						80	66	
Pr	Coal crushed	tons	4,000	**3,500**						24,000	3,500	
	Crusher availability	%	85	**78**						510	78	
	Coal inventory	tons	10,000	**5,000**						60,000	5,000	
Trans	Coal loads to Eskom	tons	3,000	3,500						15,000	3,500	-11,500
Quality	CV	MJ/kg	20	19						20	19	
	%Ash	%	30	25						30	25	
	% Vol	%	1	1						1	1	
	% S	%	1	1						1	1	
Manpower	# People- inhouse	#	100	97						100	97	-3
	# People(Contractors)	#	30	35						30	35	5
	Normal time	h	2,400	5,372						2,400	5,372	2,972
	Overtime hours	h	-	-						-	-	-
	AWOP	#	-	-						-	-	-
Controllable costs	Drilling & blasting	R	17,000	18,000						102,000	18,000	-84,000
	Fuel	R	67,000	70,000						402,000	70,000	-332,000
	ADT maintenance	R	7,000	3,000						42,000	3,000	-39,000
	Excavator maintenance	R	7,000	-						42,000	-	-42,000
	Support fleet maintenance	R	3,000	-						18,000	-	-18,000
	Crusher maintenance	R	3,000	-						18,000	-	-18,000
	Equipment Rentals	R	20,000	21,000						120,000	21,000	-99,000





SUCCESSES AND SHORTCOMINGS	
Successes	Shortcomings

The Daily Management Report depicts the daily plan versus the daily actual performance for each KPI. The daily results are captured in a weekly summary. The root causes for non-performance for production and engineering are depicted graphically at the bottom of the Report. Successes and shortcomings are noted on each report.

Step 8. Operations Optimisation

Step 8, operations optimisation deals with improving the performance of mining assets. EXR's management needs to focus on optimising the performance of the Highveld Mine. The mine is marginal and the company's performance is dependant on the profitable mining of coal from this operation. Step 8 is made up of five tasks.

- Task 8.1: Business processes
- Task 8.2: Supply chain
- Task 8.3: Cause and effect
- Task 8.4: Opportunity database
- Task 8.5: Project sheet

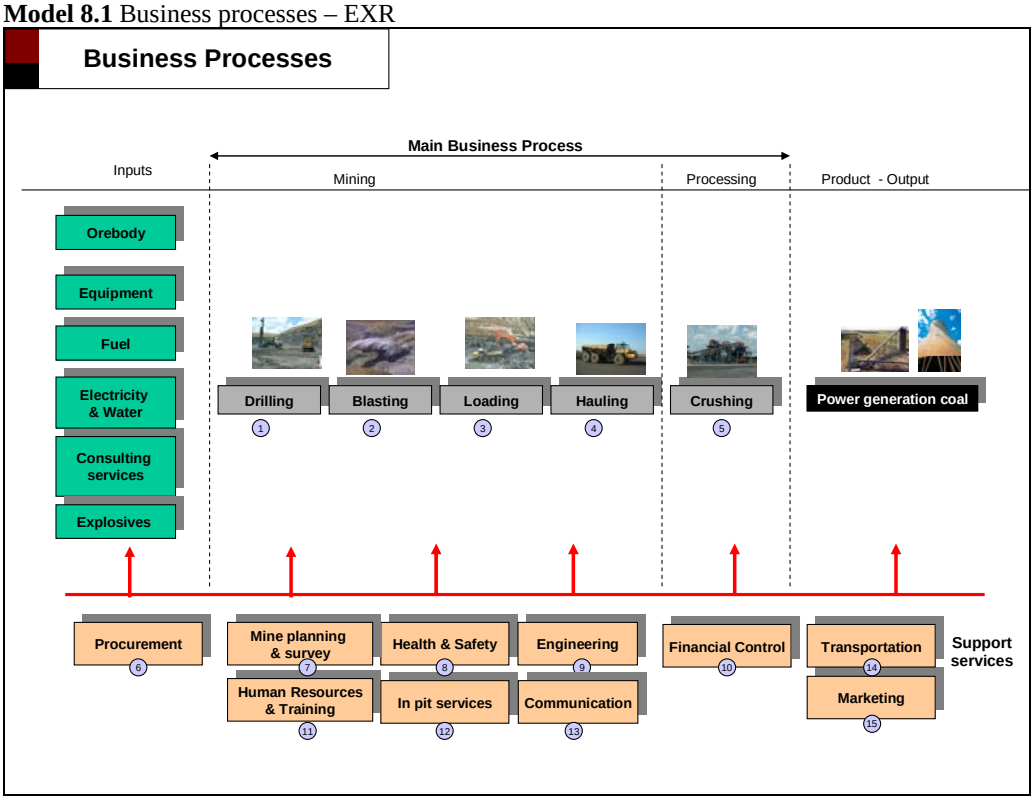
The relevant database is Database 6, chapter 4.3.6.

Task 8.1 Business Processes

Task	Area of investigation	Description	Matrixes & Models
8.1	Business processes	Mine business processes defined: inputs, main business processes, outputs, support services. The performance objectives clearly defined.	Model 8.1

The business processes on the Highveld Mine are defined below in Model 8.1. The team needs to lay out the business processes on a regular basis. This helps with the identification of opportunities. For the Highveld Mine, the inputs are the orebody, equipment, fuel, electricity and water, consulting services and explosives. The main business processes are drilling, blasting, loading, hauling and crushing. The support services are the processes of procurement, mine planning and survey, human resources and training, health and safety, in-pit services, engineering, communication, financial control, transportation and marketing. The output is power-generation coal for the local market.

Model 8.1 Business processes – EXR

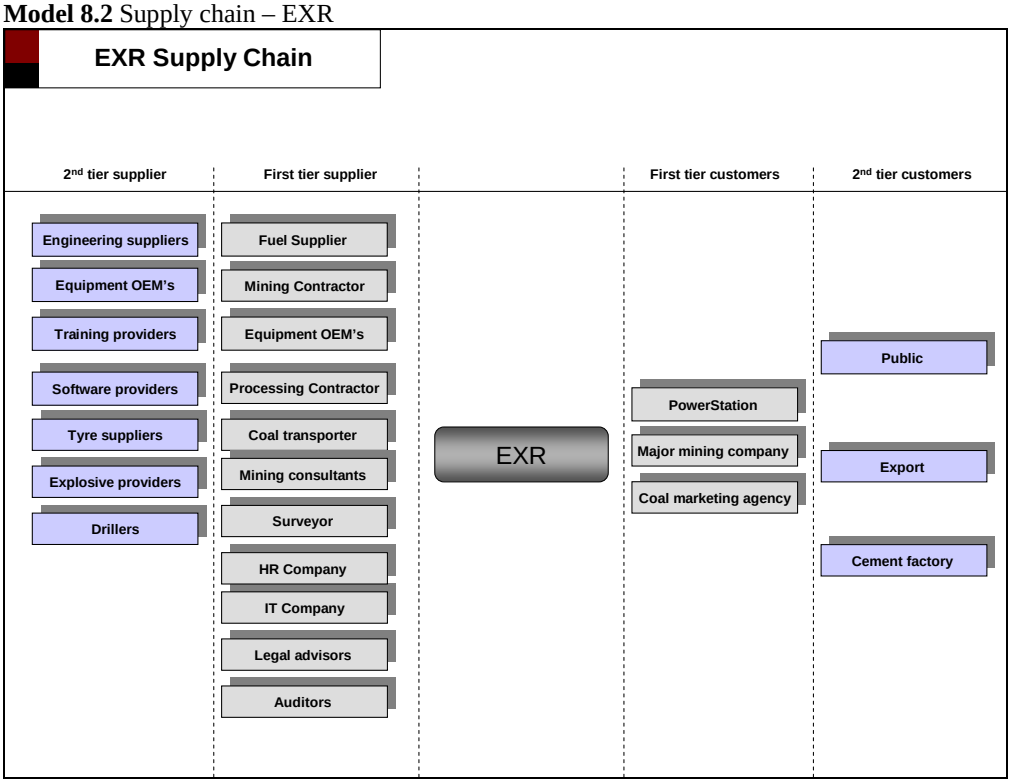


Task 8.2 Supply Chain

Task	Area of investigation	Description	Matrixes & Models
8.2	Supply chain	First and second-tier customers and suppliers understood and used for relationships and optimisation.	Model 8.2

EXR's team needs to work on the relationship with suppliers of the Highveld Mine in order to improve performance and detect possible increases in prices that may affect profitability. An example is the supplier of tyres, who as a result of the global shortage of tyres, increases the prices of tyres by 30% in one year. The effect on an opencast mine is considerable. These unforeseen events cannot be controlled, but may be anticipated through the use of Model 8.2. As EXR plans to outsource even more functions at the Ermelo Project, a clear understanding of first- and second-tier suppliers is imperative, as well as relationships with suppliers, in a market with ever increasing shortage of skills and capacity. The supply chain for the Highveld Mine is displayed in Model 8.2.

Model 8.2 Supply chain – EXR



First-tier suppliers are those supplying services to the Highveld Mine. Second-tier suppliers are those providing supplies to first-tier supplies. One grouping of first-tier

suppliers for the Highveld Mine is equipment suppliers, plant hirers, the processing contractor and the coal transporter. The second-tier suppliers to this grouping are engineering suppliers, parts providers, and tyre suppliers.

Another grouping of suppliers to the Highveld Mine is mining consultants, surveyors and an IT company. This grouping is dependant on sophisticated software to provide its services to the mine. The mine uses the services of an HR consultancy company for human resources-related services. These, in turn, use training providers to support them.

The mine has appointed drilling and blasting contractors who use state of the art drilling equipment and modern explosives. Other suppliers are lawyers and financial auditors.

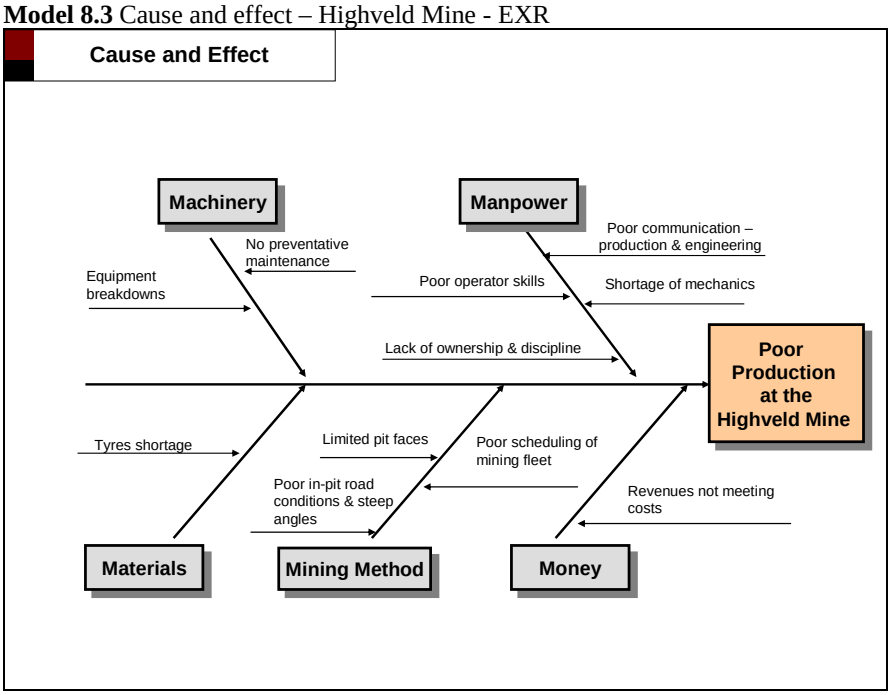
The mine has only one customer, which is the power station in close proximity to the mine. The power station in turn provides to its customer, the public.

Task 8.3 Cause and Effect

Task	Area of investigation	Description	Matrixes & Models
8.3	Cause & effect	Key operational challenge defined and a cause and effect analysis undertaken on manpower, machinery, materials, mining method and money.	Model 8.3

The operational challenge at the Highveld Mine is poor production performance. The cause and effect diagram is used to determine the causes for this poor performance in terms of manpower, machinery, materials, the mining method and money. The author believes, this is fairly representative of the dropping production performance of South African collieries in South Africa (referred to in Matrix 1.1iii) local resources industry overview). In summary, the Highveld Mine suffers from poor production as a result of a loss of mining, mechanical and operator skills, poor equipment availabilities as a result of lack of services, a shortage of materials and tyres as a result of the booming minerals sector, poor mine scheduling stemming from a lack of mining skills and the resultant cash flow constraints that stem from poor revenues.

Model 8.3 Cause and effect – Highveld Mine - EXR



Task 8.4 Opportunity Database

Task	Area of investigation	Description	Matrixes & Models
8.4	Opportunity database	Determine opportunities based on business process, supply chain, cause & effect analysis. Logging of opportunities on opportunity log, ranking of opportunities, with next action plan and responsibilities.	Matrix 8.4

The business process model (Model 8.1), supply chain model (Model 8.2), cause and effect diagram (Model 8.3) were used in a brainstorming session to determine the opportunity database (Matrix 8.4). The opportunity database entails a matrix which ranks the identified opportunity. The ranking is based on the "score", which is the product of "ease of implementation" and "impact". An action plan accompanies every opportunity. The top opportunities relate to engineering, hauling, loading and in-pit services.

Matrix 8.4 Opportunity database – Highveld Mine - EXR

EXR Highveld Coal Mine	Opportunity Data Base						Updated	Jan-05
		1=hard	1=low					
Area / Process	Opportunity from process flow review	Ease 1 to 5	Impact 1 to 5	Score Total	Quantified Impact R/month	Next Action Required	Resp.	Due date	Ref #
Engineering	Poor ADT availability - many breakdowns. Mechanics in firefighting mode. No preventative maintenance. Shortage of tools.	5	5	25	R 3,600,000	Source 3 x new mechanics. Ensure all mechanics have tools.	Engineering Manager	01-Feb-05	1
Hauling	Mismatch excavators to dumperes. Ideal ratio: 1 excavator - 4 ADT's	5	5	25	R 2,181,818	Reallocation: 1 x 80 ton excavator to 4 x 40t ADT	Production Manager	01-Feb-05	2
Loading	Limited pit loading places. Excavators waiting for dumpers.	4	5	20	R 1,636,364	Mine planning to optimize pit configuration.	Pit Foreman	01-Feb-05	3
In pit services	Poor in-pit road conditions - leads to machine damages and punctures	4	5	20	R 1,309,091	Hire in grader & dozer to assit with inpit services.	Procurement Officer	01-Feb-05	4
Mine planning	Pit ramps too steep - ADT's battling up ramp - many breakdowns	4	4	16	R 872,727	Mine planning to optimize pit configuration.	Mine Planner	01-Feb-05	5
Human resources	Lack of operator discipline, skills & knowhow of machinery - machines get abused	4	4	16	R 545,455	HR intervention: training by OEM's, machine ownership scheme.	HR Manager	01-Feb-05	6
Communication	Poor communication between mining & engineering teams	5	3	15	R 545,455	Install daily engineering production meetings.	All Foremen	01-Feb-05	7
Crushing	Plant waiting for FEL's to feed plant - mismatch of capacity.	3	4	12	R 163,636	Hire in 2nd FEL to ensure constant feed to plant.	Procurement Officer	01-Apr-05	9
Blasting	Coal lumps fed into crusher - too big to handle - crusher stoppages.	2	3	6	R 545,455	Change blasting patterns to increase framentation.	Pit Foreman	01-Apr-05	10
Procurement	Shortage of tyres. Machines with flat tyres waiting for spares	1	5	5	R 1,090,909	Consultation with OEM's	Procurement Officer	01-Apr-05	11

Task 8.5 Project Control Sheet

Task	Area of investigation	Description	Matrixes & Models
8.5	Project control sheet	Development of project control sheet to re-engineer top opportunities. Sheet to outline purpose of project, goals, benefit, project dependants, project schedule, cost and action plan.	Matrix 8.5

The team at EXR has determined that the main challenge of the Highveld Mine is improving machine availabilities. A project was set up to address this specific challenge. The project is set out in the Project Control Sheet, which is a simple project management tool. The purpose of the project, supporting operational goals, the benefit of the project, project dependants, the project schedule, project costs and an action plan for this specific project at the Highveld Mine are depicted in Matrix 8.5, the Project Control Sheet.

Matrix 8.5 Project control sheet – Highveld Mine – EXR

PROJECT CONTROL SHEET

Project: Improve machine availabilities on EXR Highveld Coal Mine
Project ref #: 1
Project Leader: Engineering Manager

Purpose of Project	Supporting Operational Goals
Improve machine availability by improving engineering department processes, skills and management	1. Source & appoint 3 mechanics 2. Purchase tools for maintance - in particular service trucks 3. Allocation: engineering staff to machinery 4. Maintenance management system installed 5. Liason with OEM's
Benefit	**Project dependants**
Monthly savings: R3.6 mill, R43 mill per annum	1. Availability of engineering skills 2. Maintenance management consultants inputs 3. OEM that are committedto working with EXR 4. Availability of finance

Project Schedule	Resp	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11
Identify shortage of engineering skills	Eng Manager											
Interview & appoint engineering skills	Eng Manager											
Purchase tools required for engineering teams	Foreman											
Allocation of equipment to engineering teams	Eng Manager											
OEM liason & inputs	Eng Manager											
Develop & implement engineering management system	Eng Manager											

Project Costs	Action	Who	Due	Ref #
R99,000 2. Tools: R100,000 plus 1 x service truck= R500,000 3. Maintenance management system: R250,000	.1. Source & appoint 3 mechanics 2. Purchase tools for maintance - in particular service trucks 3. Allocation: engineering staff to machinery 4. Maintenance management system installed 5. Liason with OEM's	EM EM FM EM		

Step 9. Team Leadership

Team leadership is integral to the success of EXR as a successful junior mining company. The following team leadership tasks are required to be undertaken as part of an effective game plan for a junior mining venture. The development of a winning organogram, job profiles for the team, profiles for the consultants, a motivating employee profit share scheme and the profiling of the team and the management team. The tasks of step 9 are thus as follows:

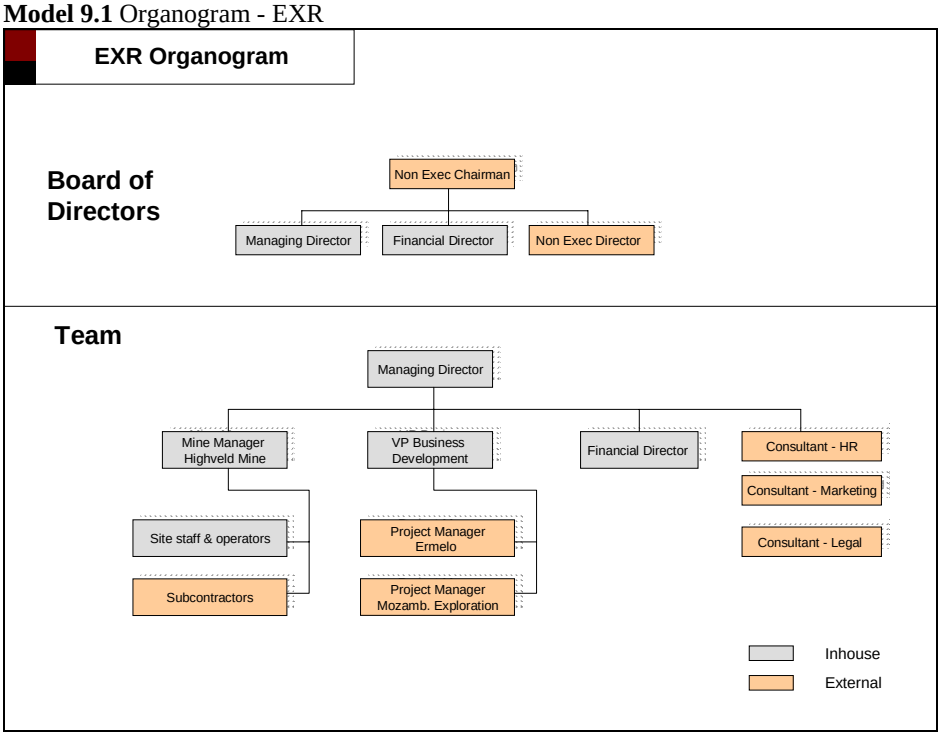
- Task 9.1: Organogram
- Task 9.2: Job profiles
- Task 9.3: Employee profit share
- Task 9.4: Leadership
- Task 9.5: Personality management

Task 9.1 Organogram

Task	Area of investigation	Description	Matrixes & Models
9.1	Organogram	Organogram of JMC board of directors and team. Positions clearly displayed.	Model 9.1

The team of EXR is structured according to an organogram, that enables leadership, facilitates growth, independent thinking, possibilities for delegation, accountabilities and rewards. The organogram for EXR, outlining the structure of the board of directors and the management team is displayed in Model 9.1 below.

Model 9.1 Organogram - EXR



The Board of Directors is made up of the Non-Executive Chairman, the Managing Director, the Financial Director and a Non-Executive Director. Independence is guaranteed by having two executive directors and two non-executive external directors.

The management team is responsible for the day to day activities of EXR. The team is headed by the Managing Director. The Mine Manager of the Highveld Mine heads up the operation, being in charge of site staff and operators, as well as subcontractors.

The Vice President Business Development heads up business development activities at Ermelo and Mozambique. Both projects are managed by mining consultancies, which have a representative reporting to them. The Financial Director manages income, expenses, budget compliance, creditors, debtors and provides monthly management accounts.

Three consultants report to the Managing Director. The Human Resources Consultant assists with industrial relations as well as HR systems and procedures on the Highveld

Mine. The Marketing Consultant ensures that EXR can secure the best prices for its coal. The Legal Consultant's responsibility is to ensure that that EXR's contracts are structured in the best interest of the company to maximize value.

Task 9.2 Job profiles

Task	Area of investigation	Description	Matrixes & Models
9.2	Job profiles	Job profiles established for JMC team and consultants. To be included are critical performance area, critical performance indicator, deliverable summary and description.	Matrix 9.2i) Matrix 9.2ii) Matrix 9.2iii) Matrix 9.2iv) Matrix 9.2v) Matrix 9.2vi) Matrix 9.2vii) Matrix 9.2viii)

The job profiles have been developed for the management team and external consultants in Matrices 9.2i) to 9.2.vii). They are practical and based on a real case scenario. Each job profile has been carefully developed and outlines the position, required experience, pre-requisites and objectives of the job. The job matrix itself provides for critical performance areas, critical performance indicators, a detailed description of the deliverables and a deliverable summary. The player of the game should, at the outset of a junior mining venture, contract with every management team member to comply with their applicable job matrix. On a half-yearly basis, the performances against the deliverables on the job matrix should be reviewed, good performance encouraged and rewarded financially and poor performance addressed through an action plan.

Matrix 9.2i) Job profiles - Managing Director - EXR

Position	**Managing Director**			
Experience	>20 years in mining industry: production and business development			
Pre requisites	Degree in Mining / Metallurgy			
Objective:	Ensure that all EXR is a well managed business, the activities of the divisions and operations are aligned with that of junior mining company: operations producing optimally, new business is developed, the company has a good safety record, the company is fi			
CPA (Critical Performance Areas)	**CPI (Critical Performance Indicators)**	**DELIVERABLES: Descripition**	**DELIVERABLES**	
Team leadership	Leadership	Bring out the best in people. Keep focus of EXR on corporate mission. Provide and ask for feedback and corrective support. Make calls regarding issues that distract the team from achieving the mission	1.1	Company leadership
	Performance management	Provide clear job profiles and deliverables for Board and Exco members, for approval by Board.	1.2	Performance management system in place for Exco
	Coordination of EXR divisions	Manage and coordinate EXR divisions to ensure alignment with corporate mission. Ensure core divisional targets, deliverables are set and implemented. Provide direction to Exco team. Regular feedback to Board.	1.3	EXR departments aligned to overall mission
	Communication, decision making	Ensure adequate forums for open communication and decision making are put in place:	1.4	Weekly Exco, weekly Partner meeting, quarterly Board meeting, appropriate Board resolutions.
Operations	Production	Ensure business plan is excuted per plan. High level management: identification of root causes, development of action plans in conjunction with BU GM and relevant Dept. Heads.	2.1	BU production plan implemented
	Health and Safety	Ensure BU is in alignment with Mine Health and Safety Act. Execute through GM and Head Legal.	2.2	Safe operation
	Financial	Ensure each BU operates profitable in accordance with business financial forecast. Execute through GM, Exco and Head Admin / Finance.	2.3	Profitable BU
	HR	Management of BU GM's. Develop BU tasks and GM job profiles. Ongoing management	2.4	Motivated, perfoming BU GMs
	Systems	Ensure functional company systems are developed and implemented by EXR departments. Operational, financial, administrative, health and safety.	2.5	Operational, financial, administrative, health and safety systems
	Client liason	Regular communication and liason with client(s), to facilitate and improve relationship, address areas of concern and identify future areas of business.	2.6	Satisfied client
Business development	Strategy	Regular analysis of mining business environment. Develop strategy, long, medium and short objectives and goals in conjunction with partners for approval by Board. Develop strategy implementation plan.	3.1	EXR strategy developed and implemented.
	Project identification and analysis	Identify opportunities of acquisition for exploration, advanced mining projects, mining contracts and mine acquisition in SA coal mining industry through networking and studies.	3.2	EXR opportunities identifies and actioned.
	Initial project analysis	Determine initial technical and economic viability of projects in conjunction with Head Business Development and others	3.3	EXR opportunities analyzed
	Networking	Netwoking with mining entrepreneurs and mining financiers to promote and position EXR for growth.	3.4	Active network
Finance	Company financial controls	Ensure EXR finacial objectives are effectively implemented via Head Admin / Finance	4.1	Adequate finacial controls
	Capital raising	Position EXR for mining venture capital raising. Identification of sources. Ensure documentation (business plan, financial documentation) is according to requirements through Dept Heads	4.2	Capital raised per strategy
	Listing	Position EXR for listing on local / offshore mining venture capital exchange. Liason with brokers. Preparation of documentation. Promotion. Ongoing communication with Board.	4.3	EXR listed on mining venture exchange
Human Resources	HR objectives	Ensure EXR HR objectives are effectively implemented via Head HR	5.1	EXR HR objectives defined and implemented.
Legal	Legal objectives	Ensure EXR legal objectives are effectively implemented via Head Legal	6.1	EXR legal objectives defined and implemented.
Marketing	Company promotion	Promotion of EXR through engagement of press, networking, development of marketing material, communication with clients, staff and workforce.	7.1	EXR branded effectively
Reporting	Management Reports	Provide Shareholders and Board with reports outlining company performance, strategy, key issues.	8.1	Annual Chairman's Reporteman Monthly Buiness Report

Matrix 9.2ii) Job profiles – Financial Director - EXR

Experience	>15 years in financial management and capital raising of resources company			
Pre requisites	B Commerce			
Objective:	Establish of ongoing financial controls and raising of capital for EXR. Enabling EXR to raise capital on a mining venture exchange			
CPA (Critical Performance Areas)	**CPI (Critical Performance Indicators)**	**DELIVERABLES: Descripition**	**DELIVERABLES**	
udgeting and Forecastin	Company budget	Establish annual company budget for implementation 1 March of year.	1.1	Company budget
	Business Unit Budget	Establish annual BU budget in consultation with BU Managers and Exco for implementation 1 March.	1.2	BU Budget
	Headoffice Budget	Establish annual headoffice budget in consultation with Exco for implementation 1 March.	1.3	Headoffice budget
Cost Control	BU weekly and monthly cost report	Provide Exco weekly and monthly feedback on budget vs commited costs per Business Unit to facilitate effective decision making at BU level.	2.1	BU budget vs committed: weekly and monthly
	Headoffice monthly cost report	Provide Exco monthly feedback on budget vs commited headoffice costs for effective decision making.	2.2	HO budget vs committed: monthly
Capital Raising	Overdraft	Ensure EXR has an overdraft facility with banks.	3.1	Overdraft facility
	Venture Capital	Liason with venture capitalists. Inform Directors of source, terms and conditions of venture capital .	3.2	Venture capital
	Debt	Raising of debt capital for EXR, where required for asset financing or project financing. Liason with banks and facilitators, securing attractive deal. Ensuring financial documentation is in accordance with requirements of finacial instititions.	3.3	Debt finance
	Equity	Raising of equity capital for EXR.	3.4	Equity finance
	Listing	Preparation of EXR for listing on local or offshore mining venture exchange	3.5	Listing documentation
Reporting	Management Reports	Provide Partners with monthly Management Accounts. Arrange for monthly feedback session.	4.1	Monthly Management Report
	Annual Financial Reports	Provide Board with Annual Financial Statements undertaken by Auditors. Develop implementation plan of Auditors recommendations.	4.2	Annual Financial Statement
Human Resources	Staffing of Financial Department	Appropriate staffing and management of financial department.	5.1	Efficient staffing and management of dept.
Systems / Software	Financial Systems	Implement user friendly and fit for purpose cost control and financial systems in the Business Units of EXR and Headoffice . Effective management of the systems.	6.1	Efficient financial systems. BU and Headoffice

Matrix 9.2iii) Job profiles - Vice President Business Development - EXR

Position	**VP Business Development**			
Experience	>15 years in resources sector, majority of time spent in business development and new mining and exploration projects			
Pre requisites	BSc Geology or BSc Mining Engineering with postgraduate commercial qualification			
Objective:	Establish a portfolio of coal assets within the framework of EXR's growth strategy with the aim of increasing the value of EXR			
CPA (Critical Performance Areas)	**CPI (Critical Performance Indicators)**	**DELIVERABLES: Description**	**DELIVERABLES**	
Exploration	Exploration opportunities	Identify exploration opportunities development of investment criteria, networking, liasion with exploration divisions of mining companies and development of depositional models.	1.1	Exploration opportunity database
	Desktop studies	Undertake desktop studies on exploration opportunities.	1.2	Desktop studies
	Aquisition of projects	Acquire exploration opportunities through farm-ins and application for prospecting permits.	1.3	EXR owned / co-owned prospecting permits
	Exploration capital raising	Establishment of funds required for various exploration stages. Preparation of documentation to raise exploration venture capital. Promotion of projects to venture capitalists / potential financiers.	1.4	Exploration funds
	Exploration management	Effective execution of exploration campaign through development of programme, appointment of drilling contractors, data analysis.	1.5	Well managed exploration projects
	Geological model development	Development of geological model from exploration data using current geological model software. Outsourcing if required.	1.6	Geological models ready for prefeasibilty and feasibility studies.
	Farm out	Identify EXR exploration projects which are to sold as a result of being non-core to business.	1.7	Farmed out projects
Advanced projects (projects where pre - feasibility study exists) and operating mines	Advanced projects identification	Identify opportunities of acquisition of advanced projects and mines in SA coal mining industry through networking and studies.	2.1	Opportunity database: # of advanced projects
	Due dilligence studies	Management of due diligence studies on advanced projects to determine the viability of EXR aquiring the opportunity. Develop economic model per opportunity.	2.2	Complete due diligence indicating go / no - go
	Acquisitions / farm ins	Preparation of an aquistion strategy for EXR for approval by the Board.	2.3	# of advanced projects ready for aquistion
	Advanced project capital raising	Establishment of funds required for project acquisition. Preparation of documentation to raise funding. Promotion of projects to venture capitalists / potential financiers. Conclusion of back- to back agreements prior to aquistion.	2.4	Funds raised / agreements with financiers
	Feasibility studies.	Undertake further studies on selected acquistion projects. Particpation in steering commitees.	2.5	Completed feasibility studies
Mining Contracting	Opportunities	Identify opportunities for mining contracting through networking liasion with potential clients. Secure invitation to tenderws	3.1	Mining contrcating opportunity database
	Tenders	Management of tendering process. Site visits, mine planning, costing, liason with suppliers, preparation of tender document.	3.2	Tender documents
	Economic analysis	Development of of economic model for mining contract.	3.3	Economic model
Reporting	Management Reports	Provide Partners with monthly feedback on business development initiatives.	4.1	Monthly Business Development Report
Human Resources	Staffing of exploration projects	Appropriate staffing / outsourcing and management of exploration projects. Outsourcing of due diligence functions and indpendent valuations to appropriate specialists.	5.1	Efficient staffing and management of dept.

Matrix 9.2iv) Job profiles – Mine Manager Highveld Mine - EXR

Position	**Mine Manager Highveld Mine**		
Experience	>15 years in mining operations		
Pre requisites	BSc or Diploma in Mining Engineering		
Objective:	Ensure Highveld Mine mines per plan to the satisfaction of the EXR. Optimize production, maximize Mine profit and mine safely.		

CPA (Critical Performance Areas)	CPI (Critical Performance Indicators)	DELIVERABLES: Description	DELIVERABLES	
Production	Mine Planning	Develop annual, quartely and monthly mine plan in consultation with appointed mine planner of EXR. Update mine plan monthly and adjust if required. Communication of mine plan to HQ.	1.1	Annual, quartely and monthly mine plan
	Coal production	Optimal extraction of coal as per agreed mine plan. Selection and scheduling of optimal fleet and manpower. Optimal sequencing of drilling, blasting, loading and hauling operations. Exploit any opportunity for increasing output.	1.1	Production targets achieved.
	Coal processing	Effective management of coal processing subcontractor, to ensure that coal products are delivered, as per mine plan, are delived to EXR clients. Ensure that processing subcontrcator is compliant with Mine Health and Safety Act. Investigate opportunities for optimization.	1.6	Tons coal crushed safely and according to specification
	Mine Standards	Ensure high mine standards are maintained at individual contracts: Optimum pit confiuration, pit rooms, maintained roads, water management.	1.7	Pit standards according to Highveld Mine and general mining norms
Engineering	Availabilities	Ensure required availabilities for mining fleet is attained through optimum staffing and management of engineering department, implementation of adequate systems, indentification and implementation of opportunities and constant liason with OEM's.	2.1	Availabilities: Trucks: 90%t , Excavators: 95%, Support fleet: 90%
	Mine infrastructure	Planning and installation of required mine infrastructure at Highveld Mine. Appointment and management of subcontractors. Mine infrastructure includes: Pumping system, diesel system, workshop. Motivation of requirements, changes and finances to Exco.	2.2	Suitable mine infrastructure to execute Contracts safely.
Health and Safety	HandS Management	Minimize incidents and accidents at Highveld Mine through effective health and safety management, talks, inspections, investigation, follow ups and record keeping.	3.1	Safe Highveld Mine BU operation
	HIRA	Implement and update HIRA system at Highveld Mine	3.2	HIRA
	Environmental	Implement and manage environmental management system at Highveld Mine, which addresses dust, oil spillages and noise.	3.3	Low dust levels on haul and crusher, no oil contamination. Environmetal management report updating and action plan.
	Legal compliance	Ensure Highveld Mine is legally compliant in terms of the Mine Health and Safety Act and the Minerals Act.	3.4	Monthly Business Development Report
HR	Staffing	Development of BU organogram, development of job profiles, recruiting and appointment of personnel at BU. Ongoing monitoring of recruits. Process done in consultation with HR consultant, who will provide onging support.	4.1	Organogram, job profiles, appointments
	Management	Management of Highveld Mine departments and staff . Provide direction, direct meetings, develop action plans, conduct follow up, mentoring and councelling, feedback sessions, feedback on employees performance and disciplinary action if required.	4.2	Well managed and motivated employees.
Financial	Highveld Mine Budget	Develop annual, quartely and monthly Highveld Mine BU Budget for approval by EXR BOD.	5.1	Annual, monthly and weekly budget
	BU weekly and monthly cost report	Provide Exco weekly and monthly feedback on budget vs commited costs of the Highveld Mine BU. Ongoing consultation with Finance Director in this regard. Stringent cost control.	5.2	Weekly and monthly BU cost report
	Cost optimization	Identify opportunities for cost savings and implement.	5.4	Cost savings programme implemented
Suppliers	Purchasing system	Implement purchasing system developed by Finance head. Approprioate staffing, management and control of purchasing function. Ongong liasion with HQ.	6.1	Purchasing systm implemented
	Creditor liason	Establish relationship with creditors. Develop database of suitable creditors of EXR going forward.	6.2	Effective creditor liason
	Subcontrcator management	Contrcators of EXR Highveld Mine BU managed optimally. Contractors pack updated.Contrcator measurement system in place.	6.3	Subcontrcators effectively managed
Client	Eskom	Participation at monthly Highveld Mine - Eskom meeting. Highlight EXR results and concerns at meeting.	7.1	EXR represented at Eskom.
Management System	Execution management	Develop and implement a management system for effective control of Highveld Mine BU departments. To include per department monthly plan and schedule, KPI measurement system (plan actual, variance) identification of root causes, meetings and action plans.	8.1	Effective Highveld Mine BU management system
	Reporting	Provide Exco with daily, weekly and monthly report on Highveld Mine BU Performance: -Daily: Production performance, health and safety - Weekly: Production performance, revenues, health and safety, engineering, committed costs vs budget - Monthly: BU Report: production performance, revenues, health and safety, engineering, committed costs vs budget	8.2	Daily, weekly and monthly Exco Performance Reports.

Matrix 9.2v) Job profiles – HR Consultant - EXR

Position	**HR Consultant**			
Experience	HR management of mining companies.			
Pre requisites	Reputable HR company			
Objective:	HR: Optimum utilization of human resources. Motivated workforce at Highveld Mine. Empowerment of people.			
CPA (Critical Performance Areas)	**CPI (Critical Performance Indicators)**	**DELIVERABLES: Descripition**	**DELIVERABLES**	
Human Resources: EXR BU's and HQ	Job profiles / Employment contrcats	Development of job profiles for the BU operational teams for management and operators. Specify deliverables and measurables. Quartely assessment of deliverables. Setting in place of support structures. Car allowance and telephone system implemeneted.	1.1	Job profile and employment contract per EXR employee
	Staffing	Liasion with BU heads regarding staffing requirements. Development of BU organogram, development of job profiles, recruiting and appointment of personnel at BU and Headoffice. Ongoing monitoring of recruits.	1.2	Effective staffing at BU level
	Salaries	Establish salaries for employees of EXR. Annual review of salary increase based on past year's performance.	1.3	Salary defined salary per employee
	Bonus system and incentives	Develop bonus and incentive schemes that enhance production, safety and labour -relations, for approval of the board / exco. Implementation thereof.	1.4	Bonus system in place
	Annual wage negotiations	Negotiate annual wage increases for workforce and staff at business units and headoffice. Liase with Chamber of Mines, captitalize on EXR membership.	1.5	Negotiated annual wage increase
	BEE	Development of a BEE policy for the Highveld Mine and at headoffice. Ensure BEE candidates are identified, assessed ito potential and mechanisims for support and training are put in place. Identification of a fast track career path for BEE candidates.	1.6	BEE policy. Individual earmarked for BEE. Mentoring of BEE candidates.
	Training	Business Units: Identify training needs at BU level. Develop / acquire training materials, select appropriate courses. Selection of candidates for training. Follow up on effectiveness of training.	1.7	Training programme identified and implemented
	HIV/AIDS	Develop HIV/AIDS Programme for EXR, as far as practically possible, in close alignment with industry standards.	1.8	HIV / AIDS programme
	Retrenchments	Develop a retrenchment system that can be applied effectively if required.	1.9	Retrenchement system
	Industrial relations	Develop grievance system. Management of grievances. Disciplinary procedures: implement	1.10	Grievance system, managed grievances.

Matrix 9.2vi) Job profiles – Legal Consultant - EXR

Position	**Legal Consultant**			
Experience	Local and international mining law			
Pre requisites	Reputable legal company			
Objective:	Ensure EXR has value adding legal contracts. .			
CPA (Critical Performance Areas)	**CPI (Critical Performance Indicators)**	**DELIVERABLES: Descripition**	**DELIVERABLES**	
Legal	Agreements / MoUs	Develop, implement, verify and audit contacts and agreements for EXR with parties it is engaged with. Applicable to existing and potential suppliers, clients and business partners. Contacts and agreements to be legally sound, liberate value for EXR and offer a win-win scenario which will benefit EXR. Seek approval by majority of Board for contracts in excess of R50 000 / month.	1.1	Concluded areements and contracts with suppliers, clients and business partners.
	Operational, Health and Safety Legal compliance	Ensure EXR is legally compliant at the BU's in terms of the Mine Health and Safety Act and the Minerals Act.	1.2	EXR legally compliant ito Mine Health and Safety Act and Minerals Act
	Insurance	Ensure EXR is adequately insured at BU and HQ levels. Insurance of equipment, accidents, key partners and	1.3	EXR adequately insured.
	Legal matters	In any legal matters at BU or headoffice, represent EXR or / organize for legal representation. Present appropriate legal advisors to Board for selection by Board. Responsible for liasion with legal representatives.	1.4	Appropriate legal representation EXR

Matrix 9.2vii) Job profiles – Marketing Consultant - EXR

Position	**Marketing Consultant**			
Experience	Coal marketing			
Pre requisites	Reputable coal trading company			
Objective:	Ensure EXR coal is marketed at maximum value to R/ton , $/ton			
CPA (Critical Performance Areas)	**CPI (Critical Performance Indicators)**	**DELIVERABLES: Descripition**	**DELIVERABLES**	
Marketing	Coal marketing	Ensure EXR coal is effectively marketed and sold at maxium value to EXR. Contract negotiations with EXR cleints	1.1	Value add marketing contract concluded
	Clients	Secure an ongoing marketing opportunities for EXR. Develop contacts and relationship with EXR clients. Client liasion and trouble shooting.	1.2	Satisfied EXR client base

Task 9.3 Employee Profit Share

Task	Area of investigation	Description	Matrixes & Models
9.3	Employee profit share	Employee profit share scheme in place which determines profit share scheme for management and employees for motivational purposes.	Matrix 9.3

Most employees in a junior mining company differ from those employed by a major mining company in that they have less job security, working hours are longer, and there is less support with regards to systems and technical support. What makes up for working in this tougher environment is the benefit of working in an entrepreneurial environment where there are many opportunities to grow professionally. In addition to this less structured environment, a big benefit needs to be financial. Employees need to share in the profits of the company.

A simple but effective profit scheme has been worked out in Matrix 9.1 This is in line with Felix Dennis's approach in Chapter 3.2 of sharing the pie in order to motivate employees and create ownership.

Matrix 9.3 Employee profit share - Highveld Mine - EXR

EXR PROFIT SHARE SYSTEM					
Revenue (R mill/ month)					
Coal sales	**9.6**	**9.8**	**10**	**10.2**	**10.4**
Costs (R mill/ month)					
Capex	0.3	0.3	0.3	0.3	0.3
Mining opencast	6.5	6.6	6.7	6.8	6.9
Crushing plant	1.9	1.9	1.9	1.9	1.9
Management	0.1	0.1	0.1	0.1	0.1
Rehabilitation Fee	0.3	0.3	0.3	0.3	0.3
Transport	0	0	0	0	0
	9.1	**9.2**	**9.3**	**9.4**	**9.5**
Company profit before profit share	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**
Profit share %	0%	5%	10%	18%	22%
Profit share R mill	**0.0**	**0.0**	**0.1**	**0.1**	**0.2**
Profit Analysis					
Profit split					
Management	40%				
Workforce	60%				
Management profit	0.0	0.0	0.0	0.1	0.1
Workforce	0.0	0.0	0.0	0.1	0.1
Total profit share	**0.00**	**0.03**	**0.07**	**0.14**	**0.20**
Company profit after profit share	**0.5**	**0.6**	**0.6**	**0.7**	**0.7**

The bonus is worked out as follows: The planned revenue per month is R9.6 million. The planned costs per month are R9.1 million. This means that EXR has a gross profit before tax of R0.5 million. At this stage EXR pays no profits to employees, as the Highveld Mine is marginal. As revenues increase, the profit increases. EXR's Board has decided on an employees' share percentage according to the line in Figure 5.14. This line is based on the profit share of 0% at a profit of R9.8 million and increases to 22% at a profit of R10.4 million. The profit-to-employees bonus is split 40% to management and 60% to employees.

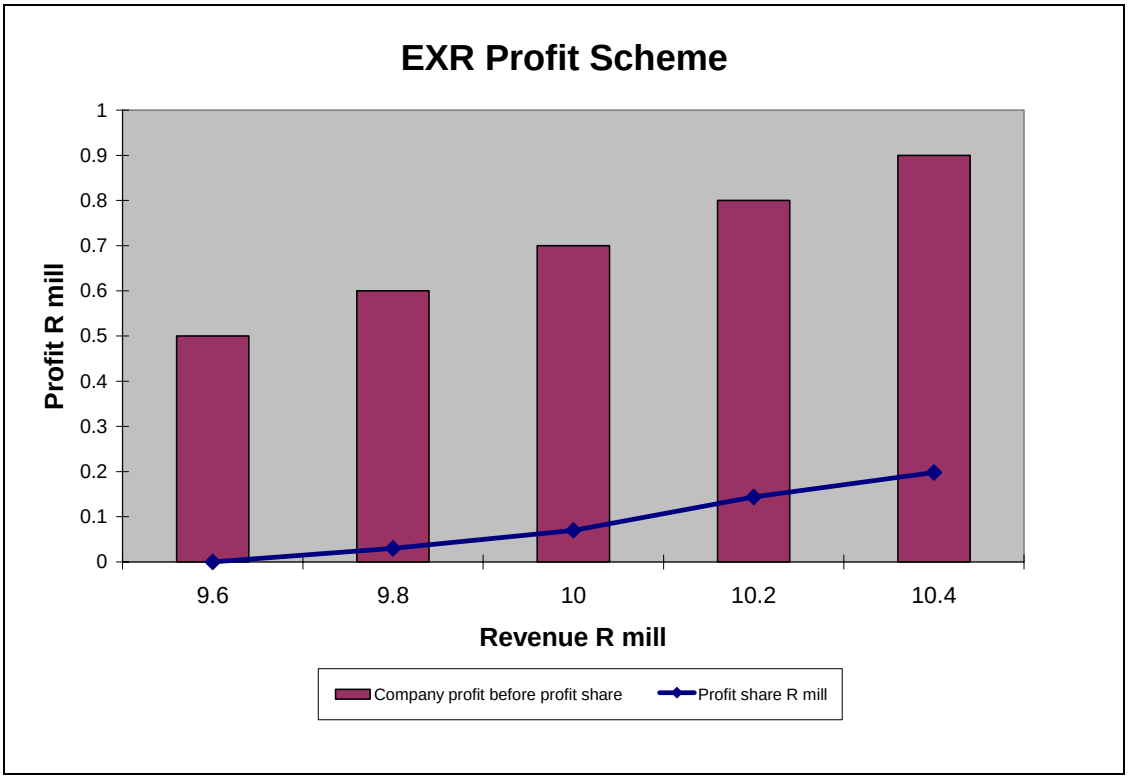


Figure 5.14 Employee profit scheme – EXR

Task 9.4 Leadership

Task	Area of investigation	Description	Matrixes & Models
9.4	Leadership	Regular communication from the CEO to convey JMC events, results, actions and future prospects.	Model 9.4

In a small company, there needs to be regular written and verbal communication from the Managing Director to the team, staff, workforce and consultants, in order for the team to be aligned with the mission of the company. Effective communication is one of the foundational elements in the Business Investment Triangle. A written communiqué from the Managing Director of EXR is presented in Model 9.4.

Model 9.4 Team leadership – communication - EXR

Team Leadership

ENERGY X RESOURCES

MESSAGE TO EXR EMPLOYEES, PARTNERS, CONSULTANTS AND CONTRACTORS FROM THE MANAGING DIRECTOR ON FIRST QUARTER'S OPERATIONAL PERFORMANCE

Safety
No incidents or accidents were reported for this quarter – well done. Let us remain focused on safety at all times, it is most important for our families and EXR.

Highveld Mine
March has proven to be the best month to date for the Highveld Mine. We have improved significantly since January, and I want to thank all of you for your efforts. EXR must recover from the poor performances in December, January and February, and March is our first good month. More visible leadership, extensive management involvement, the resultant team involvement, improved communication, the use of tippers and a rented-in grader were amongst the main reasons that have contributed to improved performance.
Challenges, which need to be addressed are engineering availabilities, dozers, communication, machine cleaning and greasing, operator availabilities, support services and procurement streamlining. We are going to spend our efforts to improve and assist the engineering team with increasing availabilities.

Ermelo Project
We have now completed the final mine plan for the feasibility study which is required for the financing campaign to raise the necessary project finance. EXR's project structures have been set up and we are preparing all the necessary technical documentation for the capital raising campaign.

Mozambique Exploration Project
We have commenced with the drilling campaign at our coal exploration properties in Mozambique. The exploration camp has been established and we look forward to the input from industry expert xxx. The property hosts the potential for natural gas, and we will investigate the viability of this opportunity together with joint venture partners.

Leadership
We have changed the leadership structure at Highveld Mine in line with our need to focus on productivity. XYZ is the appointed Mine Manager for the Highveld Mine and requires your full support in moving the mine forward to profitability.
Thank you for working hard this month. Let us position ourselves for a growing future.
Kind regards,

_____
Managing Director
Energy X Resources

Task 9.5 Personality Management

Task	Area of investigation	Description	Matrixes & Models
9.5	Personality management	Have the BOD analysed the personalities of the team members to play on their strengths and overcome their weaknesses?	Matrix 9.5

The Managing Director, Financial Director, Vice President Business Development and Mine Manager of the Highveld Mine are the most senior employees of EXR. Each employee represents a different personality with different strengths, weaknesses and needs, which need to be identified and managed to maximise the performance of the employees. In a small junior mining company environment, where a few people make a huge difference to the company's performance, this activity is vital for success. In Matrix 9.5, the personalities of the EXR management team have been charted in terms of strengths, weaknesses and needs. Following this, a confidential management plan has been developed to manage the diverse personalities.

Matrix 9.5 Personality management – EXR

Managing Director	**Financial Director**	**Director Business Development**	**Highveld Mine Manager**
Lion/ Otter	Beaver / Golden Retriever	Beaver / Golden Retriever	Beaver/ Lion
Description Leader, boss, fun loving, bottom line orientated, flashy	**Description** Perfectionist , strong need to do things right, by the book, loyal	**Description** Perfectionist , strong need to do things right, by the book, loyal	**Description** Leader, not team player, perfectionist, strong need to do things right, by the book, loyal
Strengths Decisive, goal oriented, achievement driven, motivator	**Strengths** Diligent, great for quality control Focus on present Team player	**Strengths** Diligent, great for quality control Team player	**Strengths** Independent Goal oriented, achievement driven Focus on quality control
Weakness Blunt, direct, rude, attacks verbally if under pressure, poor listener Quick to get to the point	**Weakness** Won't make decision unless he has all facts, slow at decision making Avoids confrontation when needed, holds a grudge, gets hurt	**Weakness** Won't make decision unless he has all facts, slow at decision making. Too quiet at meetings, needs to be more confident.	**Weakness** Blunt, direct Views project more important than people Too hard on self & others
Needs: Results, variety, new challenges, freedom, authority, opportunity for advancement, fun, social activities	**Needs:** Clearly defined tasks, stability, security, gradual change, low risk, tasks requiring precision & planning, stability	**Needs:** Clearly defined tasks, stability, security, gradual change low risk, tasks requiring precision & planning, stability	**Needs:** Results Clearly defined tasks Stability Security
Management ✓ Provide MD with new challenges in new coal market, freedom, authority, opportunity for advancement, support with detail orientated FD & technical team, give recognition	**Management** ✓ Provide FD with clear tasks, secure job environment, own space.	**Management** ✓ Support with confident, extravert assistant (otter) for networking purposes and interaction with suppliers and consultants.	**Management** ✓ Decentralised approached to provide independence ✓ Provide security by supporting decisions ✓ Focus on people management skills

Summary: Operations Management Pillar - EXR

The operations management pillar has led to the development of an operations management system for EXR, operations optimisation of the Highveld Mine, and an effective method of managing the team of EXR.

The operations management system (OMS) for EXR is built around the only asset of EXR, the Highveld Mine. The OMS is the key management tool for production management and will have to be duplicated for the Ermelo Project, once it is in production. Key performance indicators were determined for the mine's opencast operation. The OMS system flow was determined with the elements of forecasting, planning and scheduling, executing and reporting. Each element in turn was described: The 10 year annual mine plan summary, the monthly mine plan, the equipment schedule, the manpower schedule, the shift report and the daily management report. These are all tools required for the successful management of the mining asset.

Step 8 dealt with the optimisation of the mining asset, operations optimisation, in particular optimising the performance of the marginal Highveld Mine. To identify opportunities for improvement, the business processes of the Highveld Mine were mapped, the supply chain with first- and second-tier suppliers was determined and a cause and effect diagram was constructed. It was determined that a loss of mining, mechanical and operator skills, poor equipment availabilities as a result of lack of services, a shortage of materials and tyres, poor mine scheduling stemming from a lack of mining skills and the resultant cash flow constraints all resulted in the poor production performance of the mine. Further, an opportunity database was established in a brainstorming session, where opportunities per business process were determined, ranked and an action plan was set up. The top opportunities at the Highveld Mine related to engineering, hauling, loading and in-pit services. The team determined that the first challenge to be addressed at the the Highveld Mine was improving machine availabilities. A project was set up to address ADT machine availabilities. The project was managed via the Project Control Sheet.

Step 9 dealt with team leadership, which is integral to the to the success of EXR and is required to be undertaken as part of an effective game plan for a junior mining venture.
An organogram was developed, depicting the board of directors and management team. The team at EXR was made up of both in-house employees as well as external consultants. Job profiles were done for each management team member, which are to be used as a contract, spelling out the position, required experience, pre-requisites, objectives of the job, critical performance areas and indicators, and a description of the deliverables.

A simple, yet effective employee profit scheme was presented, which is key in motivating, retaining and rewarding employees in the tough junior mining environment. Equally important in a small company is regular written and verbal communication from the Managing Director to the team, staff, workforce and consultants, in order for the team to be aligned with the mission of the company. A model for communication was presented.
Finally, a personality management matrix was presented. A small junior mining company is reliant on every individual. The matrix determined the strengths, weaknesses and needs of every management team member, from which a confidential management plan has been developed to manage the diverse personalities.

5.5.3 Risk Management Pillar

The risk management pillar entails the steps of identification, quantification and management of risks pertaining to EXR. Again, each step is made up of tasks. For details, please refer to Chapter 3.5.4.

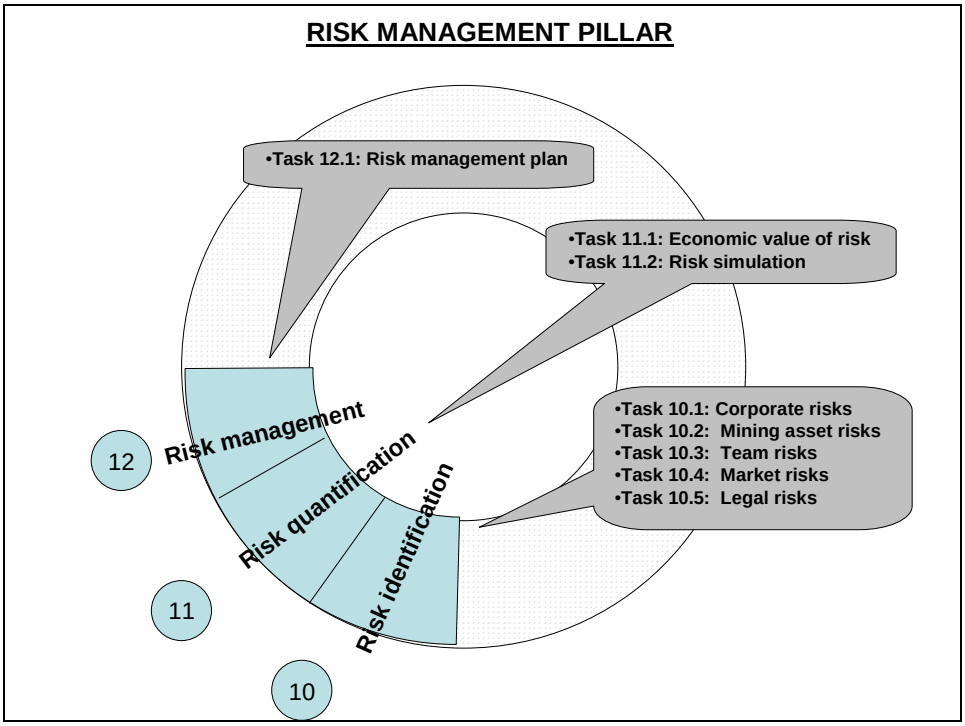


Figure 5.15 EXR risk management pillar

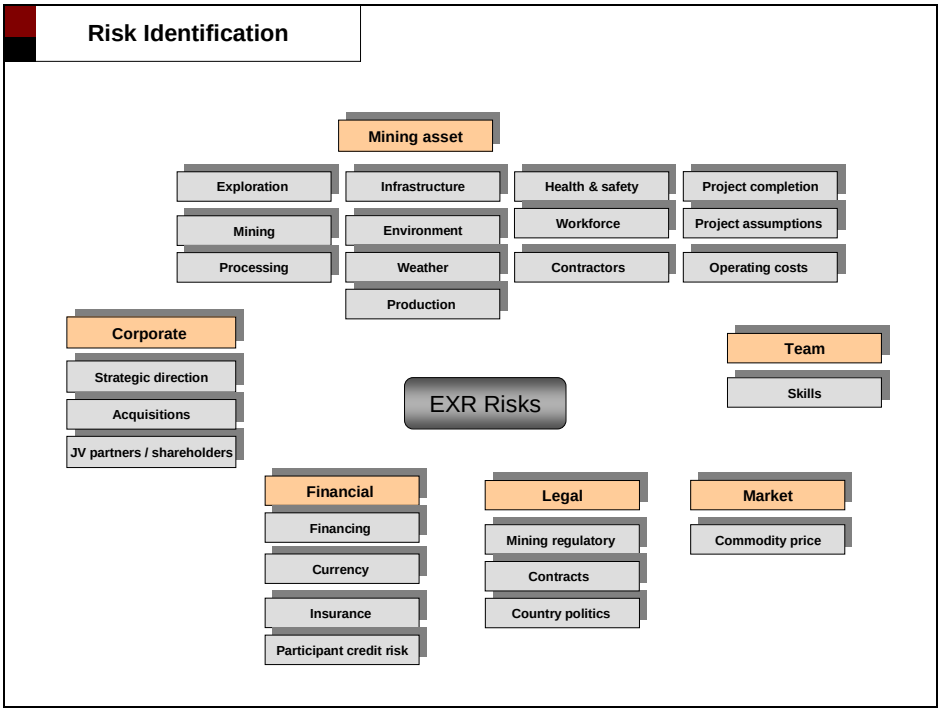
Step 10. Risk Identification

Step 10 comprises five tasks relating to the identification of risks. These are:

- Task 10.1: Corporate risks
- Task 10.2: Mining asset risks
- Task 10.3: Team risks
- Task 10.4: Market risks
- Task 10.5: Legal risks

Risks applicable to EXR need to be identified. Model 10.1 outlines the different risk areas for corporate risks, mining asset risks, team risks, market risks, legal risks and financial risks.

Model 10.1 Risk identification – EXR



The relevant database, which supports the identification for EXR, is Database 8, “Risks identified for mining projects “, in Chapter 4.3.8.

Task 10.1 Corporate Risks

Task	Area of investigation	Description	Matrices & Models
10.1	Corporate risks	Corporate risks identified relating to: strategic direction, acquisitions, JV partners & shareholders, corporate governance	Model 10.1

Strategic direction: This risk implies that the strategic direction taken by the Board of Directors of EXR is suboptimal. The basis of this could entail a wrong forecast of the coal market and that the selected EXR strategy of diversification and entering new markets do not yield the results as expected.

Acquisitions: EXR has acquired the Ermelo Project and the exploration tenements in Mozambique. These opportunities will change the scale of the business and may expose the EXR to new geographic, political, operating, financial and geological risks. The new ore bodies could prove to be below expectation and there could be the difficulty of establishing the Ermelo operations. There can be no assurance that EXR will be successful in overcoming these risks encountered in connection with such acquisitions.

JV partner / shareholders: Firstly, this risk implies a lack of consensus between one of the BEE partners or at the EXR Board. This risk can also imply that there is a shareholder dispute at the EXR Holding. The reason is that the joint venture partners of the shareholders which come from differing backgrounds, different company cultures and have different areas of expertise, are not able to come to a consensus with regards to major decisions and that there is a lack of trust.

Corporate governance: This risk implies that the EXR Board does not comply with the corporate governance practices and that the company's profile is subsequently eroded with a resultant flight of investments.

Task 10.2 Mining Asset Risks

Task	Area of investigation	Description	Matrices & Models
10.2	Mining asset risks	Mining asset risks identified pertaining to geology and exploration, mining, processing, infrastructure, the environment, weather, production performance, health and safety, industrial action, contractors, project completion, project assumptions and operating costs.	Model 10.1

Geology and exploration risks: Coal exploration is highly speculative in nature and involves many risks. Substantial expenditures are required for the Ermelo Project and in Mozambique to establish proven and probable reserves through drilling to determine the optimal extraction method for the coal seams, the beneficiation process needed to achieve the requisite coal quality and to construct mining and processing facilities. There is no assurance that coal will be discovered in sufficient quantities or have the appropriate qualities.

Mining risks – Highveld Mine: EXR is engaged in open-pit mining at the Highveld Mine. The mining risk entails unusual or unexpected rock formations and pit slope failures, as well as the selection of a suboptimal mining method. Such occurrences could result in damage to mineral properties or production facilities, personal injury or death, delays in mining and monetary losses.

Processing – poor yields: The yield of the coal product is a function of the coal geology, the method of mining, but mainly the coal beneficiation. EXR will try to achieve a yield as high as practically possible, as a greater yield means more final product. This risk implies that, despite efforts, EXR fails to achieve yields as forecast.

Infrastructure risks: The Mozambique Project is located in the remote Tete area, adjacent to a mega-mine which is to be established. The project is dependant on the establishment of infrastructure from the mega-mine, such as roads, railway lines, access to water, and a coal port. Any delays in the establishment of the mega-mine will delay the establishment of EXR's Mozambique project. Further, coal mining and processing are demanding on water resources. The inability to secure access to sufficient water at the

Highveld Mine or the Ermelo Project, or to secure water at cost effective prices, will increase operating costs.

Environmental risk: EXR coal mining operations are subject to stringent environment legislation. Existing and possible future environmental and social impact legislation, regulations and actions could cause significant expense, capital expenditure, restrictions and delays in EXR's activities, the extent of which cannot be predicted.

Weather – force majeure: Extensive rainfall will negatively affect operations at EXR's Highveld Mine, where opencast operations need to stop if the openpit is flooded. Mozambique is frequently subject to tropical storms and cyclones. These can affect exploration activities.

Production – below plan due to poor machine availabilities: This risk implies that production performance at the Highveld Mine is below plan as a result of poor machine availabilities due to breakdowns, lack of maintenance procedures, a shortage of engineering skills and a shortage of supplies.

Health and safety of employees: Mining is a high risk environment and constant implementation of health and safety management systems, procedures and training are required to ensure safe mining. In Africa, the main risk to health is contracting malaria or AIDS. EXR, being operational in South Africa, is affected by the possibility of the workforce at the Highveld Mine and the Ermelo Project contracting HIV/AIDS with a resultant drop in productivity if the disease is not addressed with anti-retroviral programmes and AIDS education.

Workforce - industrial action by workforce: South Africa's mining industry has frequently been characterised by industrial action led by unions, over issues such as pay increases, leave, and/or security of jobs. This may manifest as strikes or go-slows and lead to property damage. Any industrial action at the Highveld Mine may cause production to come to a standstill.

Contractors - non-performance: The services of contractors will be engaged for the construction, commissioning and operation of the Ermelo Project. The non-performance of construction and commissioning contractors will delay the start-up of the project. Non-performance of mining and beneficiation contractors will result in lower production rates and efficiencies.

Completion risk – Ermelo Project: The risk that the Ermelo Project will not be completed on time and within budget. The delay in production start-up can be attributed to a delay in granting of permits, not being able to secure the finance in time, a longer than forecasted design phase, a lack of skills and a shortage of construction and supply material. It is important for the Ermelo Project to come into production in the 'upswing' phase of the coal commodity cycle. During this phase the project has the opportunity to incur sufficient revenue to pay back the capital expenditure. A delay in production start-up means that the Ermelo Project will be able to take less advantage of the upswing in coal prices and move into the downward swing sooner than expected.

Project assumptions: Ermelo Project: The Ermelo Project relies on assumptions which are based on facts and information gained from historic coal mining experiences, industry norms and circumstances specific to the project. These assumptions may be too optimistic and aims, targets, plans and intentions may not be realized as predicted.

Operating costs – escalating: Operating costs at the Highveld Mine or at the Ermelo Project can increase as a result of various factors which are both within and outside the control of EXR. Reasons include: poor operational management, increase in tyre expenses as a result of tyre shortages, increase in diesel costs, a shortage of skills, increase in steel and construction material prices, increasing prices from OEM and mining contractors as a result of supplier shortages, additional social upliftment requirements or administrative costs which were not budgeted for.

Task 10.3 Team Risks

Task	Area of investigation	Description	Matrices & Models
10.3	Team risks	Risks relating to skills & company leadership.	Model 10.1

Lack of skills: The increase in global mining related activities has depleted the available pool of talent available to EXR. EXR is at risk, specifically as the shortage of mechanics has a direct impact on machine availabilities. EXR needs to compensate for being an entrepreneurial company by paying above market related salaries and introduce share incentive schemes to attract scarce mining skills. There is no assurance that EXR will be successful in implementing its human resources plan.

Task 10.4 Market Risks

Task	Area of investigation	Description	Matrices & Models
10.4	Market risks	Market risk relating to a falling commodity price, which is a function of demand and supply.	Model 10.1

Falling commodity prices: Commodity prices fall as a result of imbalances in demand and supply. EXR's profits are directly related to the volume and price of coal sold. Global warming is a reality and is forcing western governments to look at alternative sources of energy. In the long-term, this can entail a drop in coal prices for coal destined for the European continent. A large number of coal projects are in a feasibility stage in South Africa and should come into production within the next five years. This could result in a greater supply of commodities and, in turn, to an oversupply with downward pressure on coal prices. If realised coal prices fall below the cost of production and remain at such a level for any sustained period, EXR will experience losses.

Task 10.5 Legal Risks

Task	Area of investigation	Description	Matrices & Models
10.5	Legal risks	Risks relating to mining legislation, contracts and host country politics.	Model 10.1

Mining regulatory: EXR's activities are dependent upon the granting and maintenance of appropriate licences, concessions, leases, permits and regulatory consents. This risk implies that licences and approvals required to construct and operate the Highveld Mine, Ermelo Project and Mozambique Project are not granted or are withdrawn or that they become prohibitively expensive as a result of delays in being issued. There is no assurance that when the licences expire, they will be renewed or what the terms of such renewal would be.

Country politics - South Africa and Mozambique: This is the risk of political uncertainty of the countries hosting EXR's mining assets. These risks include nationalisation, creeping expropriation and suspension of foreign exchange. Also, operations may be affected to varying degrees by government regulations with respect to restriction on production, price controls, export controls, currency remittance, income taxes, expropriation of property, foreign investment, maintenance of claims, legislation, land use, land claims of local people, water use, or mine safety.

Contractual risks: There is a risk that the contracts concluded between EXR, key suppliers, coal purchasers and the host government, which are deemed to be legal, binding and consistent are interpreted differently by the different parties and subject to dispute.

Task 10.6 Financing Risks

Task	Area of investigation	Description	Matrices & Models
10.6	Financing risks	Risks relating to financing, currency, insurance and participants.	Model 10.1

Financing: EXR will have to raise R56 million through its listing campaign to optimise the Highveld Mine's balance sheet, complete the bankable feasibility study for the Ermelo Project and conduct initial exploration in Mozambique. Further, a project finance facility of R60 million needs to be secured. Despite positive indications, there is no guarantee that EXR will be able to raise the required capital for its programme.

Currency movements: EXR's holding company is based in the UK, while its operations are based in South Africa and Mozambique. The Highveld Mine incurs revenues and costs in Rands. However, major fleet components are imported from overseas and denoted in US$, Yen or Euros. The mine will be affected by a depreciating R/$ exchange rate. The Ermelo Project is focussed on export coal and in turn requires a depreciating R/$ exchange rate to get maximum benefit from the stronger US$ for its coal product. The company is exposed to foreign exchange currency movements.

Insurance risk: EXR maintains liability insurance in an amount that it considerers consistent with industry practice for a company in the exploration and development stage. The nature of possible risks at the Highveld Mine, Ermelo Project and Mozambique Project is such that liabilities could exceed policy limits, in which event EXR could incur significant loss, that could materially affect its financial condition.

Participant credit risk: There is the risk that the project sponsors of the Ermelo Project are unable to support the project financially to the extent required. This implies that EXR has to secure additional funding from elsewhere and this could cause a delay in the project start-up.

Step 11. Risk Quantification

Step 11 comprises two tasks.

- Task 11.1: Economic value of risk
- Task 11.2: Risk simulation

Task 11.1 Economic value of risk

Task	Area of investigation	Description	Matrices & Models
11.1	Economic value of risk	Have the probability and impact of the corporate, operational, team, market, legal and financial risks been determined? Has a risk ranking been undertaken of high, medium and low risks?	Matrix 11.1i) Matrix 11.1ii)

Task 11.1 is the most analytical task of the game plan. The quantification of the risks identified proceeds as follows:

i) Determine the overall EXR company NPV and IRR. Use the company NPV as a basis for brainstorming the impact of the risks.
ii) Brainstorm the impact and probability for the risks identified in a session facilitated by consultants with the board of directors and management team. Next, determine the Economic Value of the identified risks, which is the product of probability and impact.
iii) Rank the economic values of the risks, in order to determine the top, medium and low risks.
These steps were undertaken with the following results:

i) EXR company NPV and IRR

The EXR company cash flow is the summary of the cash flows for the Highveld Mine, the projected cashflow for the Ermelo Project and the Mozambique exploration project. It is displayed in Figure 5.16. It can be seen that the cashflow is marginal for the first 4 years, representing the marginal operation Highveld Mine operation. In year 4, the cashflow drops massively, representing the layout of the capital cost for the Ermelo Project. From year 5 onwards, the cashflow is marginally improved, as the Ermelo Project moves into production.

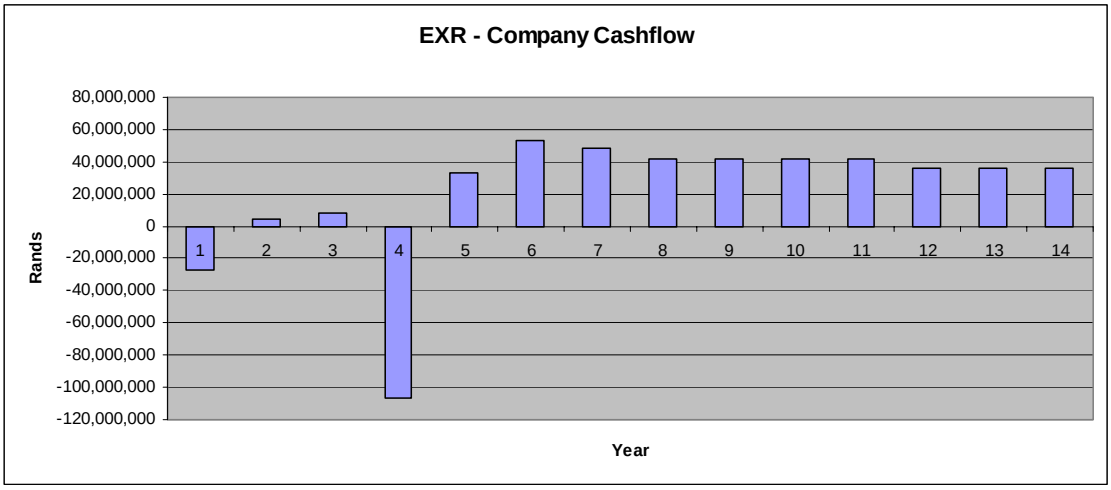


Figure 5.16 EXR company cashflow

The economic assessment of the company EXR and its projects is as follows:

- ✓ Highveld Mine: NPV (at a 12% discount rate) R6.2 million, IRR: 18%
- ✓ Ermelo Project: NPV (at a 12% discount rate) R91.0 million , IRR: 32%
- ✓ Mozambique Project: Annual expenses R2.5 million per annum
- ✓ EXR company: NPV (at a 12% discount rate) R65.6 million and IRR is 26 %. These values are the combination of the financial performance of all three mining assets. When determining the impact of the risks, the key value considered is the EXR NPV, which serves as a benchmark for the brainstorming sessions.

ii) The impact, probability and economic value for the risks identified

The brainstorming session held by the team of EXR yielded the following probabilities and impacts for the identified risks.

Matrix 11.1i) Impact, probability and economic value of risks - EXR

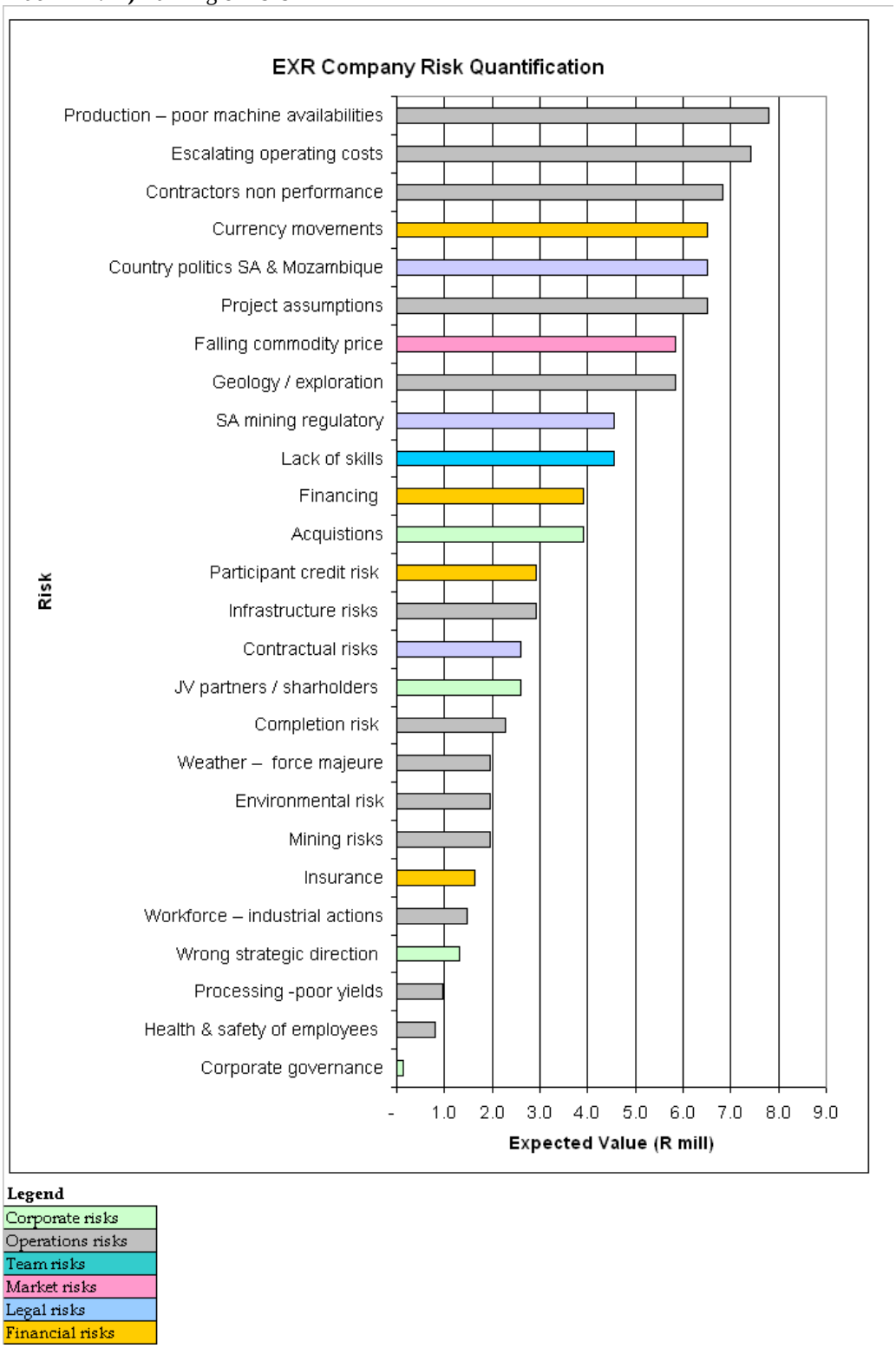
EXR RISK QUANTIFICATION	Expected Values		
Risk	Low = <20% Medium: 20% - 50% High:>50%	Impact (R mill)	Expected value (R mill)
Wrong strategic direction	20%	6.5	1.3
Acquistions	30%	13	3.9
JV partners / sharholders	40%	6.5	2.6
Corporate governance	1%	13	0.1
Geology / exploration	30%	19.5	5.9
Mining risks	15%	13	2.0
Processing -poor yields	10%	9.75	1.0
Infrastructure risks	15%	19.5	2.9
Environmental risk	15%	13	2.0
Weather – force majeure	10%	19.5	2.0
Production – poor machine availabilities	40%	19.5	7.8
Health & safety of employees	25%	3.25	0.8
Workforce – industrial actions	45%	3.25	1.5
Contractors non performance	35%	19.5	6.8
Completion risk	35%	6.5	2.3
Project assumptions	40%	16.25	6.5
Escalating operating costs	38%	19.5	7.4
Lack of skills	70%	6.5	4.6
Falling commodity price	30%	19.5	5.9
SA mining regulatory	70%	6.5	4.6
Contractual risks	40%	6.5	2.6
Country politics SA & Mozambique	25%	26	6.5
Financing	20%	19.5	3.9
Currency movements	50%	13	6.5
Insurance	5%	32.5	1.6
Participant credit risk	15%	19.5	2.9

Legend

Corporate risks
Operations risks
Team risks
Market risks
Legal risks
Financial risks

iii) Ranking of risks the economic values of the risks

Matrix 11.1ii) Ranking of risks - EXR



Interpretation:

High risks for EXR

- ✓ The majority of the top risks for EXR are operational risks, followed by financial, market and legal risks.
- ✓ The highest risk for EXR is the poor production performance at the Highveld Mine as a result of poor equipment availabilities. The EV of this risk is R7.8 million.
- ✓ This is followed by escalating operating costs at R7.4 million.
- ✓ The risk of contractors not performing is the fourth highest risk at an EV of R6.8 million.
- ✓ Project assumptions, currency movements and the country politics are the fifth highest risks with an EV of R6.5 million respectively.
- ✓ The risks associated with falling coal prices and geology and exploration follow at an EV of R5.9 million.
- ✓ The high risks are those that the EXR team needs to focus on.

Medium risks for EXR

- ✓ The medium risk grouping entails risks from all categories
- ✓ The risks of SA mining regulatory issues and lack of skills for the highest of the medium risk group, at an EV of R4.6 million.
- ✓ Next are the risks of financing and acquisition at an EV of R3.9 million.
- ✓ Participant credit risks and infrastructure risks both have an EV of R2.9 million.
- ✓ Contractual risks and risks relating to JV partners and shareholders have a an EV of R 2.6 million.
- ✓ The operational risks of project completion, weather – force majeure, environmental risks and mining risks are the remaining risks of the medium risks grouping at EVs ranging from R2.3 million to R2.0 million.

Low risks for EXR

- ✓ Low risks are those with EVs below R1.6 million.

- ✓ These are the risks relating to insurance, industrial action by the workforces, EXR taking the wrong strategic direction, poor processing yields, risks relating to health and safety of employees and risks relating to corporate governance.

Task 11.2 Risk Simulation

Task	Area of investigation	Description	Matrices & Models
11.2	Risk simulation	Have the risks' effects been simulated on the economic model of the company?	Matrix 11.2

The purpose of risk simulation is to determine the impact of the risk on main performance drivers. The identified risks of EXR impact negatively on the following parameters: production, yield, coal price, operating costs and capital costs. Matrix 11.2 displays how these parameters may be affected.

Matrix 11.2 Risk simulation

#	Risks	Parameter
1	Production – poor machine availabilities	Production drop, increase in operating costs
2	Escalating operating costs	Increase in operating costs
3	Contractors non performance	Increase in operating costs Drop in production
4	Project assumptions	Change in production, yield, coal price, operating costs and capital costs
5	Currency movement	Change in capital costs and operating costs
6	Country politics	Increase in operating costs, drop in production
7	Falling commodity prices	Drop in coal price
8	Geology / exploration	Drop in yield, drop in production

i) Sensitivity analysis

To determine the sensitivity of the parameters, the change in parameters has been simulated on the economic model of EXR, and the results (EXR company IRR versus the changes in parameters ranging from -10% to +10%) are displayed in Figure 5.15.

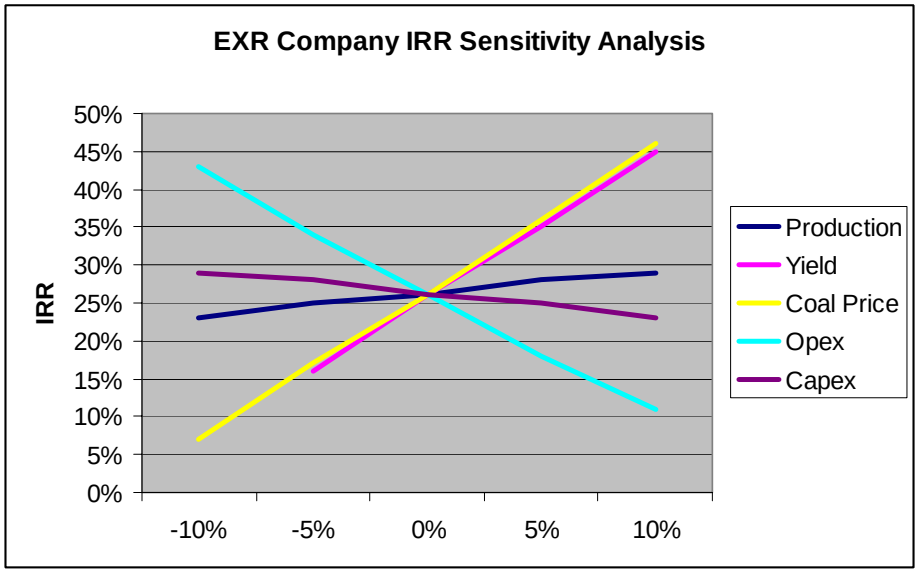


Figure 5.17 EXR company IRR sensitivity analysis

Interpretation:

It is clear that the most sensitive parameters are yield, the coal price and operating costs. The company is less sensitive to changes in production and capital cost increases. The graph confirms the importance of managing production performance, escalating operating costs, contractor performance and project assumptions as the top risks for EXR, as these mainly affect the operating cost of the company.

ii) Simulation of risks

The combination of risks is simulated on the EXR company cashflow and company IRR. By undertaking this simulation, the team is provided with an understanding of possible profitability scenarios of EXR.

For the purpose of the simulation, the simulation software '@Risk' was utilised, which linked directly into the economic model of EXR in the Excel spreadsheet. '@Risk' defines all possible outcomes for an individual risk as a distribution function and incorporates them as a single cell value in the economic model. The following distribution formula was used for the simulation process:

RiskIntUniform(minimum, maximum)

RiskIntUniform specifies a uniform distribution with a minimum value and a maximum value. To determine the minimum and maximum values for the simulation, a workshop was held with EXR's management team. The team decided to incorporate the upside as well as the downside. Minimum and maximum values were determined for both the Highveld Mine and Ermelo Project in terms of production, yield, coal sales price, capital costs and operating costs. The detailed economic model with risk formulas is in Appendix E (The software @Risk is required to launch the model). The effect of the risks is expressed in terms of the impact of the combination of risks on the company IRR and company cash flow.

Results 1: The impact of the combination of risks on the EXR company IRR:

The results show that the mean IRR for the simulated risks is 27%. The 70th percentile equates to an IRR of 30%. This can be read as follows: there is a 70% probability that the EXR company IRR is 30% or less. By mining investment standards, this indicates that EXR represents an attractive investment opportunity, meeting the hurdle rate set by many banks at +20%.

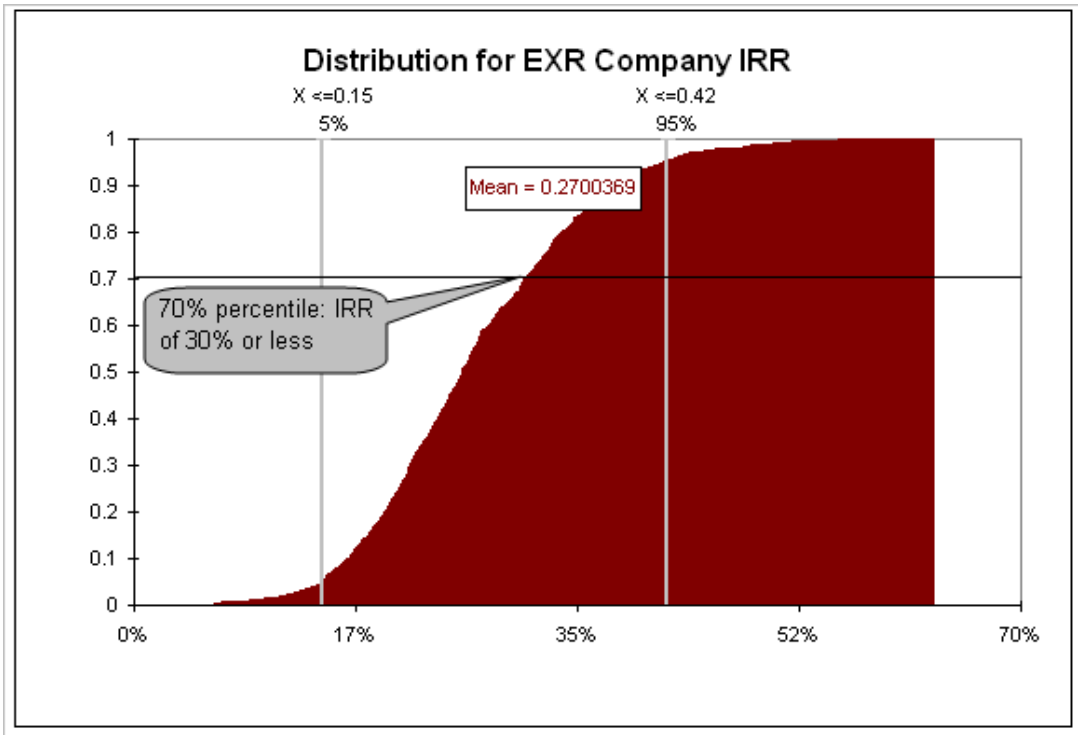


Figure 5.18 Distribution of EXR company IRR

Results 2: The effect of the combination of the risks on the company cash flow

A summary graph was drawn to determine the variations of the EXR company cashflow over a 14 year life. The graph summarises the probability distribution across the entire cashflow, displaying changes in risk over time. Displayed are the mean, two upper band values (+1 standard deviation and the 95th percentile of each distribution) and two lower band values (-1 standard deviation and the 5th percentile of each distribution). An increase in width corresponds with a larger variability of results. The mean cashflow is demarcated by the yellow line. The brown band indicates the $\pm$1 standard deviation values, while the green bands show both the +95th percentile and –5th percentile values.

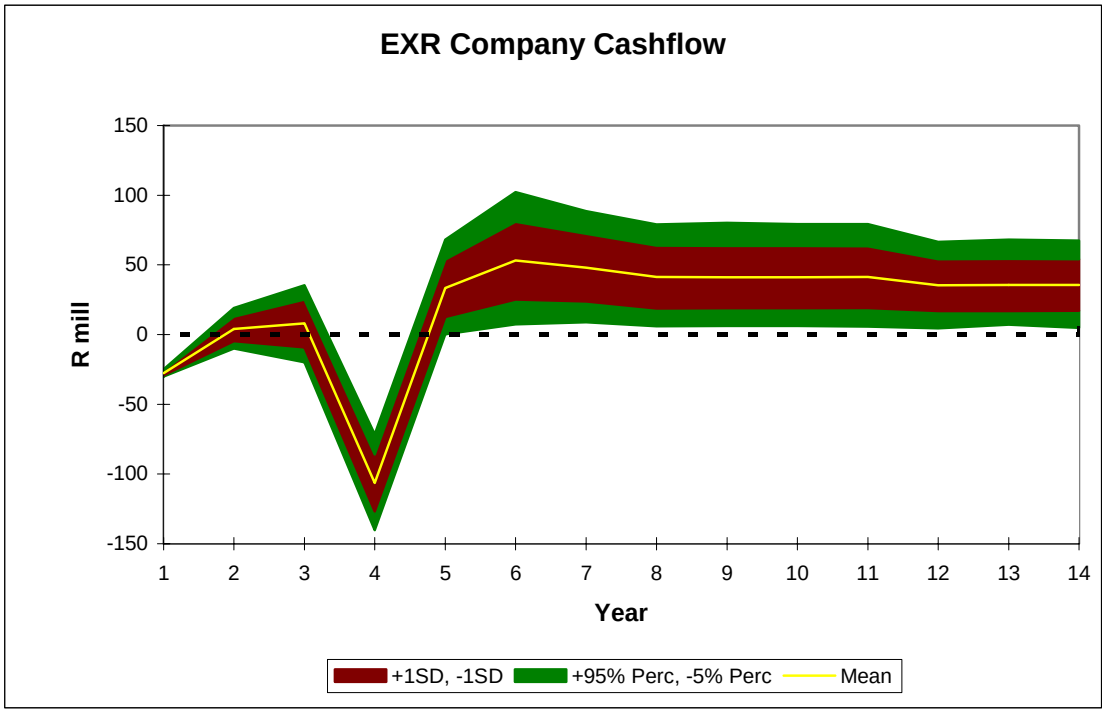


Figure 5.19 Distribution of EXR company cashflow

The mean project cash flow begins at -R25 million in year 1 and moves gradually towards a positive cash flow in year 2. This period represents the marginal cashflow of the Highveld Mine. In year 4, the cashflow drops rapidly to R-100 million, as a result of the capital investment in the Ermelo Project. Once the Ermelo Project is in production the

cashflow moves rapidly into positive terrain at an annual average of +R45 million. This highlights the significant contribution of the Ermelo project towards profitability. The upper band values indicate a significant upside in profitability. The company is only cash negative for 2 of the 14 years and the average company cashflow ranges from R75 million to R100 million after the Ermelo Project has come into production. The lower band values, on the contrary, indicate negative or marginal values throughout the life of the company, reflecting a threat to ongoing business. This scenario represents the identified risks materialising.

Figure 5.17 also indicated that the company cashflow was subject to more cashflow variations after the Ermelo Project has been established, than during the period of the Highveld Mine alone. This indicates that the Ermelo Project has a far greater impact on the success or failure of EXR than the Highveld Mine. In summary, however, the upside is greater than the down side. What EXR's team has to work on is managing the controllable risks, to ensure that EXR can realise the upside and manage any downside.

Step 12. Risk Management

Step 12 is the last step in the risk management pillar and of the activity of "Playing the Game". There is one task associated with this step:

- Task 12.1: Risk management plan

Task 12.1 Economic value of risk

Task	Area of investigation	Description	Matrices & Models
12.1	Risk management plan	Has a risk management plan been defined for the JMC's high and medium risks?	Matrix 12.1i) Matrix 12.1ii)

The risk management plan needs to look at the high and medium risks. Outlined in Matrix 12.1 are the risk, the expected value, the controllability and the management of the risk. The risk management plan is a summary of the actions that EXR has identified with regards to managing the risks. The actions are either strategic or tactical.

i) Management of High Risks of EXR

Matrix 12.1.i) Management of high risks - EXR

Risk	Expected value	Controllability	Risk management
Production – poor machine availabilities	R7.8 m	Control	✓ Focus on preventative maintenance and regular services ✓ Implement proactive maintenance management system ✓ Search for and attract mechanical skills, incentivise ✓ Focus on machine operator discipline and training to avoid abuse ✓ Ensure favourable pit conditions ✓ Engage OEMs and suppliers ✓ Develop and implement operations management system
Escalating operating costs	R7.4m	Control / no control	✓ Collaboration with suppliers ✓ Implement cost control systems ✓ Develop and implement operations management system

Contractors non performance	R6.8m	Control	✓ Appoint reputable contractors ✓ Implement performance guarantees ✓ Secure step-in rights if there is poor performance by contractor ✓ Develop and implement operations management system
Project assumptions	R6.5m	Control	✓ Review of assumptions by independent technical and financial advisors. ✓ Include a 10% contingency in inputs. ✓ Scenario planning
Currency	R6.5m	No control	✓ Hedging ✓ Matching mine development currency with revenue currency ✓ Establish escrow accounts offshore
Country politics	R6.5m	No control	✓ Investment Protection Agreement ✓ Political risk insurance ✓ Establish escrow accounts offshore
Commodity price	R5.9m	No control	✓ Independent market study ✓ Price hedging arrangements
Geology / exploration	R5.9m	No control	✓ Thorough evaluation of geological information ✓ Usage of internationally acceptable resource evaluation standards ✓ Independent resource evaluation

ii) Management of Medium Risks of EXR

Matrix 12.1.ii) Management of medium risks - EXR

Risk	**Expected value**	**Controllability**	**Risk management**
Mining regulatory	R4.6m	No control	✓ Consultation with local authorities
Lack of skills	R4.6m	Control	✓ Identify and promote talent in-house as far as is practically possible. ✓ Partnerships with tertiary institutions to secure talent. ✓ Create attractive working environment – reward performance. ✓ Attract “old timers” back into the company to share expertise and mentor young talent.
Financing	R3.9m	Control / no control	✓ Seek reputable financiers and undertake due diligence on lenders ✓ Establish network with mining financier ✓ Ongoing promotion of the company
Acquisitions	R3.9m	Control	✓ Thorough due diligence on acquisition targets. ✓ Scenario planning. ✓ Obtain opinions from industry experts
Participant credit risk	R2.9m	No control	✓ Credit evaluation of sponsors ✓ Minimise the support required from weak sponsors

Infrastructure risk	R2.9	No control	✓ Cannot influence the infrastructure of the host country ✓ Secure water supply upfront
Contractual risks	R2.6m	No control	✓ Legal due diligence process ✓ Use legal jurisdiction that is accepted by the mining investment community
Shareholders & JV partners	R2.6m	No control	✓ Due diligence on new shareholders and jv partners. ✓ Negotiated shareholders / jv agreement.
Completion risk	R2.3m	Control	✓ Secure completion guarantees from suppliers ✓ Fixed price and fixed time turn-key contracts with suppliers
Weather – rain – force majoer	2.0m	No control	✓ Due diligence to establish nature of possible force majeure events ✓ Insurance
Environmental risk	R2.0m	Control	✓ Implement Environmental Management Plan ✓ Independent opinion by environmental consultants. ✓ Ongoing monitoring
Mining risks	R2.0m	Control	✓ Appointment of reputable mining consultants to provide monthly mine planning input. ✓ Use of reputable mining contractor ✓ Implement operations management system

Summary: Risk Management Pillar - EXR

The risk management pillar has led to identification of risks, the quantification of risks and a detailed risk management plan for EXR.

In Step 10, corporate risks, mining asset risks, team risks, market risks and legal risks were determined for EXR using Model 10.1. In Step 11, the impact and the probabilities of the identified risks were brainstormed by EXR's management team, using the company NPV as a basis for the impact and probability of the risks. The exercise determined the high, medium and low risks for EXR.

The majority of the top risks for EXR are operational risks relating to the Highveld Mine, the highest risk being poor production performance as a result of poor equipment availabilities. This was followed by escalating operating costs, the risk of contractors not performing, project assumptions, currency movements, country politics and falling coal prices. Low risks are those relating to insurance, industrial action by the workforces, the wrong strategic direction, poor processing yields, risks relating to health and safety of employees and risks relating to corporate governance.

A sensitivity analysis was undertaken, which revealed that the most sensitive parameters to EXR are yield, the coal price and operating costs. The impact of the combination of risks was simulated using the risk software '@Risk', to determine the impact on EXR's company IRR and company cashflow. The results provided an understanding of EXR's cashflow against the risks and showed that there is a 70% probability of achieving an IRR of 30% or less.

A risk management plan was drawn up for the high and medium risks. Some risks can be controlled, some not, but EXR's management can ensure that it has mechanisms in place to manage the risks as far as possible.

5.6 Scoring the Game - EXR

The final step of his chapter entails determining the score for EXR in order to benchmark EXR as an investment opportunity and provide the executive team with an assessment of the winning potential of the company EXR.

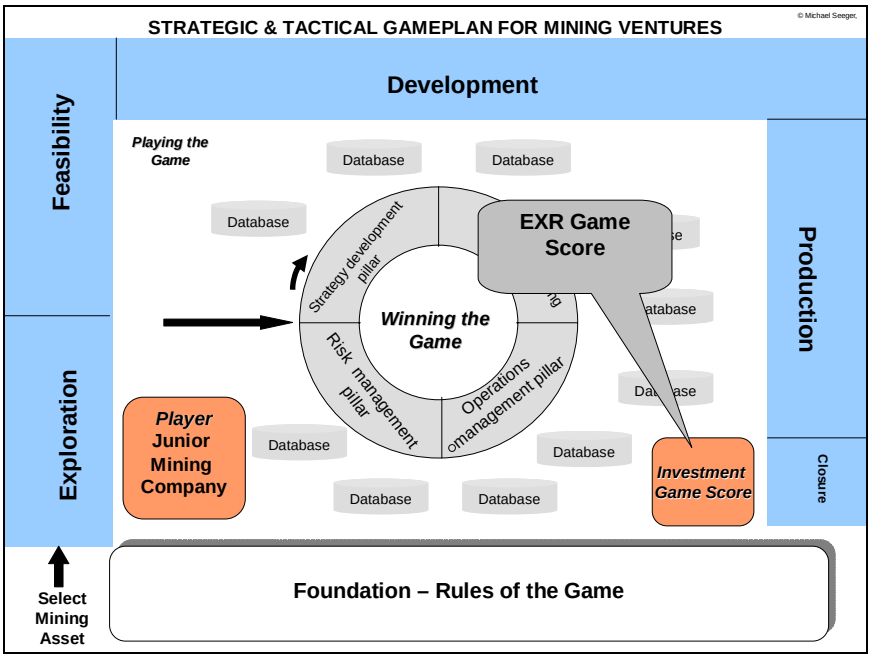


Figure 5.20 EXR scoring the game

The following are scored and assessed:

- ✓ The mining asset: the Highveld Mine, the Ermelo Project feasibility study and the Mozambique exploration tenements. The assets contribute 25% of the game score.
- ✓ The business pillars: the strategy, legal and financial, operations and risk management pillars of EXR. The business pillars contribute 50% of the score.
- ✓ The financial performance of EXR. The financial performance contributes 25% of the game score.

The score ranges between 5 (excellent) and 1 (not achieved).

5.6.1 Scoring the Mining Asset

Scoring of the mining assets is based on a simple score model. The following are assessed.

- Location / host country: Attractiveness of host country to mining investment community
- Legal: Assessment of the ownership structures
- Geology and exploration: Degree of geological complexity of the orebody, exploration undertaken to date
- Resources and reserves: Extent of the resources and commercially viable reserves
- Mining: Assessment of the degree of complexity of mining
- Equipment: Assessment of the mining equipment
- Processing: Assessment of the degree of complexity of processing the mineral
- Production: Assessment of production performance
- Infrastructure: Availability of infrastructure to facilitate mining operations
- Logistics and supplies: Assessment of the logistics and supply dynamics at an asset level
- Marketing: Attractiveness of the commodities market which will facilitate ease of marketing.
- Human resources: Assessment of the human resources dynamics at a mine / project level.
- Environmental and social: Key environmental and social considerations at mine and project level.
- Economic analysis: Project returns which allow for ease of financing

Matrix: Mining asset score

5: excellent, 4: good, 3: fair, 2: poor, 1: not achieved

Elements	Description - Purpose - Goals - Objectives	Highveld Mine	Score	Ermelo Project	Score	Mozambique Exploration Project		Score
Location / host country	Attractiveness of host country to mining investment community	The mine is located in close proximity to an Eskom power plant and mining related infrastructure.South Africa is an attractive mining country, but the investment community is critical about South Africa's new minerals policy.	4	The property is located in close proximity to coal siding and RBCT railway line. South Africa is an attractive mining country, but the investment community is critical about South Africa's new minerals policy.	4	Mozambique incentivises exploration projects	4	**4.0**
Legal	Assessment of the ownership structures	74% ownership of the mine	4	74% ownership of the project	4	50% ownership of the exploration properties. Farm ins to be negotiated	3	**3.7**
Geology and exploration	Degree of geological complexity of the orebody, exploration undertaken to date	Thermal coal deposit, poor quality, low degree of geological complexity, low stripping ratio, minimal dykes	4	The project situated in the geologically compex Eastern Transvaal coalfield. Medium to thin coal seams. Historical exploration undertaken by major mining house.	3	The project is located in Mozambique's coal province. No mine has been estabished yet in the area. There has been exploration on nearby properties. EXR has not yet commenced with drilling on the properties.	3	**3.3**
Resources and reserves	Extent of the resources and and commercially viable reserves	Medium -small resources and reserves.	3	Attractive resources and reserves	5	Extent of resources and reserves unknown, but exploration results of properties in close proximity have yielded promising results.	4	**4.0**
Mining	Assessment of the degree of complexity of mining	Simple opencast mining	5	Underground bord and pillar mining.	3			**4.0**
Equipment	Assement of the mining equipment	Mining equipment utilised is aged and characterised by poor availabilities.	2	New mining equipment to be used	4			**3.0**
Processing	Assessment of the degree of complexity of processing the mineral	Simple crushing process	5	Coal washing required to ensure multiproduct market.	4			**4.5**
Production	Assement of production performance	The mine is not meeting production targets as a result of poor availabilities	1	Not in production yet				**1.0**
Infrastructure	Availability of infrastructure to facilitate mining operations	Mine in close proximity to good infrastructure	4	The project is located in an established mining area.	4	No infrastructure available. The success of the project is dependant on the go-ahead of the major mine feasibility study which will develop infrastructure.	2	**3.3**
Logistics and suppliers	Assement of the logistics and supply dynamics at an asset level	Mining is done in-house. Relationships with suppliers need to be improved.	3	It is planned to appoint reputable mining, processing and transportation contractors.	4	The remoteness of the project will increase the costs of logistics and supplies.	2	**3.0**
Marketing	Attractiveness of the commodities market which will facilitate ease of marketing.	The income per ton thermal coal is marginal, but may increase, given the increasing demand for electricity in South Africa.	4	Product is high value coal and will secure premium price.	5	Product is high value coal and will secure premium price.	5	**4.7**
Human resources	Assement of the human resources dynamics at a mine / project level.	The mine is plagued by a lack of skills. The cost of engineering staff has increased rapidly.	3	It is planned to appoint reputable mining and processing contractors. Attracting skilled management may become a challenge.	4	Mozambique has little mining skills available	2	**3.0**
Environmental and social	Key environmental and social considerations at mine and project level.	The Highveld Mine is operating in an environmentally sound manner. The mine has a good safety record. No social projects have been initiated.	4	The project is not located in an environmentally sensitive area. New legislation however may delay the permitting process.	3	EXR can easily comply with the environmenal legistative requirements. Big support from local community	4	**3.7**
Economic analysis	Project returns which allow for ease of financing	Minimum value add through crushing process only. Economic analysis: marginal at an IRR of 18%.	2	Project has an IRR of 32% and will atract project financing.	5			**3.5**
			3.4		**4.0**		**3.2**	**3.5**

Discussion: EXR mining assets

Highveld Mine: The score of 3.4 indicates that the asset is rated GOOD. The most attractive aspects are simple opencast mining, simple processing and close proximity to the Eskom power plant. The low quality coal and low R/t per ton coal contribute to a low IRR of 18%, but this may change given pending increases in coal prices. A key concern is that the mine is not meeting production targets.

Ermelo Project: This is the most attractive asset in the portfolio of EXR. The project has attractive resources and reserves and the market for the high quality coal for export purposes is excellent. The coal has good processing properties and the mine is situated in a well-established mining area. Investors will line up to finance the project with an IRR of 32%. Overall, this asset scores 4.0, which is EXCELLENT

Mozambique Exploration Projects: These exploration tenements are remotely located, but the geology, coal quality and extent of resources appear to be highly attractive, based on the results of the major mine being developed in close proximity. Despite the dependency on the go-ahead of the major mine and the unknown extent of the resource, this is a GOOD asset with a score of 3.2.

EXR Mining Asset Score: The total mining asset score of EXR is 3.5, which will classify the mining assets as GOOD.



5.6.2 Scoring the Business Pillars

i) Score: Strategy Development Pillar

Matrix: Strategy development pillar score

			5: excellent, 4: good, 3: fair, 2: poor, 1: not achieved		
Step	Task		Description - Purpose - Goals - Objectives	Score	Comments
Step 1. Business review	1.1	Global, regional and local resources industry overview	Overview of the applicable resource industry in a global, regional and local context.	3	Management has a fair understanding of the global and local coal industry. Little understanding of the regional SADEC based coal industry.
	1.2	Players and competitors	Understanding and description of major and junior miners in the game that compete with the company: company description, corporate structure, vision and strategy, mining assets, the team, financial performance.	4	Good understanding of major and junior coal players and JMC competitors on international stock exchanges.
	1.3	Projects and operations	Types of operations applicable to the commodity determined and classified into exploration projects, feasibility studies, mine development projects and mines. Description of geology, exploration activities, resources and reserves, mining, processing, production, infrastructure, logistics and suppliers, marketing, human resources, SHEQ and financial data.	4	Good understanding of coal projects and operations in South Africa, Africa and Australia.
	1.4	Host countries	Analysis of the host countries of the JMC's projects:implications for the JMC determined.	4	Good review of EXR host countries SA and Mozambique. SA presents huge potential in terms of increased electricity demand and resultant need for coal.
	1.5	Technology	A review of technological trends pertaining to the commodity market and implications for the JMC.	2	Technological trends identified. Clean coal projects are difficult to implement for EXR as a coal miner that is not involved in the value-add chain. South Africa has a conservative approach to clean energy.
	1.6	Key success factors	Determine key success factors for the JMC pertaining to corporate structure, resources, financing, mining, processing, engineering, infrastructure, suppliers, market, SHEQ, human resources and legal structures.	3	Key success factors determined, but not communicated sufficently to operational team.
	1.7	Opportunities	Listing of local and international opportunities for the applicable resources sector.	4	Various exiting opportunities have been identified for EXR in the coal mining sector.
	1.8	Pest analysis	An analysis of political, economic, socio cultural and technical environments.	4	EXR management team has a very good understanding of political, economic, socio cultural and technical environments. In summary, a positive environment exists for junior coal mining ventures.
	1.9	Porter 5 Forces	An analysis of the five forces interacting on the resources sector: suppliers, potential entrants, buyers, substitutes and industry competitors. Where does the power lie and what are the implication for the JMC?	3	Porters 5 forces analysed. The power lies with suppliers as the market is expanding and there is a skills and capacity shortage.
	1.10	Company SWOT	Determine strengths and weaknesses, opportunities and threats for the JMC.	4	The team has a very good understanding of the company's strengths and weaknesses, opportunities and threats relating to the changing coal market.

Step 2. Strategy development	2.1	Vision, mission and objectives	Vision, mission and objectives of JMC defined, based on market opportunities.	3	The EXR team has workshopped the company's vision, mission and objectives, but these have not been effectively communicated down to the staff and workforce.
	2.2	Strategic options	Strategic options for the JMC developed, in alignment with industry analysis and company SWOT. Strategies defined for expansion, diversification, cost reduction, differentiation, focus and new market opportunities.	4	Strategic options have been workshopped by the team, in sessions facilitated by consultants and in alignment with identified opportunities.
	2.3	Strategy selection	Strategic options ranked and selected for the JMC, based on consistency with mission, building on strengths, overcoming weakness, technical and financial feasibility, skills availability, acceptable risk and attractiveness to stakeholders.	3	Strategy selection has followed process as outlined. Shortcoming: i) not all options have been economically evaluated,ii) the selection has been based on a conservative approach and there has been a low appetite for alternative solutions.
Step 3. Strategy implementation	3.1	Strategic framework	Development of the 7s strategic framework which outlines the interaction of strategy, structure, systems, style, staff and skills.	5	The strategic framewok has been set for EXR. The company needs to cater for the looming skills shortage.
	3.2	Strategic staircase - 7 year plan	Development of a strategic staircase which provides an overview for the major strategic steps in relation to a time line and provides a reference to capacities required.	4	The strategic staircase has been developed and is in alignment with opportunities in the coal market. The steps follow the path of a cashflow generating starting position, capacity growth and diversification into new coal ventures. This path leads to an intergrated mid-tier, SADEC focused coal producer in year 7.
	3.3	Strategy implementation plan	Presentation of an implementation plan that translates corporate objectives into tasks and action plans for operations, business development, marketing, financial, legal, research and development and human resources.	3	A high level implementation plan has been developed. More details are required.
	3.4	Milestone chart	Development of a high-level milestone chart highlight core activities and time lines for the team	4	The milestone chart for the listing has been developed and the company has set an eleven month programme to be listed on an intrenational mining stock exchange.
			SCORE	**3.6**	

ii) Score: Legal and Financial Pillar

Matrix: Legal and financial pillar score

			5: excellent, 4: good, 3: fair, 2: poor, 1: not achieved		
Step	Task		Description - Purpose - Goals - Objectives	Score	Comments
Step 4. Legal Structuring	4.1	Holding structure	Development of optimal holding and operational structure for the JMC, which will facilitate funding, participation of investors at various levels, BEE and shareholder value.	5	EXR has set up a suitable holding structure. The holding company will be offshore, in one of the international mining capitals, and the operational company will be based in SA. This will facilitate easy funding into EXR.
	4.1	Project Special Purpose Vehicle	Project SPV for JMC's project set up in a manner that is clear and facilitates value. Outline project relationship to project sponsors, financiers, advisors, suppliers, equipment OEMs, the market, insurers, the host government.	3	EXR has established the architecture of the Ermelo SPV, and the success of the structure remains to be proven.
Step 5. Financing	5.1	Valuation	Company valuation process undertaken. The foundations are the project NPV's and comparable market transactions. Undertake 2 - 3 different company valuations and average to determine company value. To be included are exploration costs, cash, equity, debt, surface stockpiles and overheads.	3	Company valuation has been undertaken inhouse, but needs to be done by an independent, reputable mining consultancy.
	5.2	Financing structure	Company's financing clearly structured to cater for various project stages and facilitate ease of financing.	3	EXR has been unable to follow the traditional JMC financing route as it is based in risk-averse South Africa. Intelligent partnerships with suppliers got the company started on the Highveld Mine. The company needs to source further risk capital to grow and optimise its financial structure.
	5.3	Financing equity	Equity financing activities in place to secure risk capital for the JMC. Equity financing processes relating to the JMC listing on a stock exchange defined: competent person's report, financial audit, legal audit, prospectus, marketing material. Company ready to pursue listing route.	3	EXR has not been able to secure sufficient equity financing. It is reliant on the offshore listing to secure finance the developoment of he Ermelo Coal Mine. Extensive preparations by BOD and management team required.
	5.4	Financing debt	Debt financing processes in place with repayment, interest, and general terms that facilitate company growth. Debt financing process understood.	3	EXR has been able to secure debt financing facilities via equipment suppliers and will need to secure non-recourse project finance for Ermelo Coal Mine development, through the project SPV.
Step 6. Financial Management	6.1	Budget	Accurate, ambitious operational budget with realistic targets.	2	Budget in place, has been developed by directors, but needs input and buy-in from operational people.
	6.2	Cashflow management system	Analysis of cash flows (inflow and outflow), to allow for proper management of cash in the business.	3	Cashflow management sytem has been put in place and is supported by on-site financial controller.
	6.3	Supplier age analysis	Analysis of JMC creditors for 120, 90, 60 and 30 days to provide overview of cash flow outflows.	2	Creditor age analysis in place. EXR need to reduce backlog and improve rlationships with suppliers to the Highveld Coal Mine.
			SCORE	**3.0**	

iii) Score: Operations Management Pillar

Matrix: Operations management pillar score

			5: excellent, 4: good, 3: fair, 2: poor, 1: not achieved		
Theme	Task		Description - Purpose - Goals - Objectives	Score	Comments
Step 7. Operations Management System	7.1	KPI's	Have the operational KPI's for safety, mining, engineering, processing, transportation, quality, manpower been identified?	4	Top KPI's for EXR operational businesses have been defined.
	7.2	Operations Management System layout	Description of the operations management system (OMS) layout in terms of forecasting, planning and scheduling, executing and reporting	3	The OMS system layout has been developed for the mining process. Outstanding are the coal processing, transportation and administrative functions.
	7.3	Forecasting	Development of 10 year and annual mine plans for the mining operation.	3	10 year and annual mine plan in place.
	7.4	Planning and Scheduling	Development of a monthly mine plan from which manpower and fleet are scheduled to meet the monthly mine plan.	2	Monthly scheduling of fleet and manpower done infrequently and does not cater for changing site conditions on Highveld Coal Mine.
	7.5	Executing	Accurate reporting on key indicators at operational level to allow for action plans on a daily basis. Action plans are in place and discussed in daily review meetings.	2	On-site operational meetings need to be held more regularly and focus on root causes for deviation. Too irregular follow-up.
	7.6	Reporting	Analytical information of JMC to allow proper monitoring of the operational performance. Plan versus actual and root causes for deviation presented.	2	Reporting good at director, exco and senior management level, but not at operational level.
Step 8. Operations Optimisation	8.1	Business processes	Mine business processes defined: inputs, main business processes, outputs, support services. The performance objectives clearly defined.	5	The business processes have been defined with the assistance of an external business process optimisation consultant.
	8.2	Supply chain	First and second tier customers and suppliers understood and used for relationships and optimisation.	1	Supplier relationships have been identified and need to be improved significantly.
	8.3	Cause and effect	Key operational challenge defined and a cause and effect analysis undertaken on manpower, machinery, materials, mining method and money.	4	Root cause of poor performance at Highveld Mine well understood.Poor machine availablities.
	8.4	Opportunity database	Determine opportunities based on business process, supply chain, cause and effect analysis. Logging of opportunities on opportunity log, ranking of opportunities, with next action plan and responsibilities.	2	Opportunities logged but no follow up on action plan
	8.5	Project control sheet	Development of project control sheet to reengineer top opportunities. Sheet to outline purpose of project, goals, benefit, project dependants, project schedule, cost and action plan.	2	A project control sheet has been developed but has not been implemented yet.

Step 9. Team Leadership	9.1	Organogram	Organogram of JMC board of directors and team. Positions clearly displayed.	2	Organogram in place but the workforce on the Highveld Coal Mine is not clear about the leadership structure of EXR.
	9.2	Job profiles	Job profiles established for JMC team, consultants, staff and supervisors. To be included are critical performance area, critical performance indicator, deliverable summary and description.	2	Job profiles are in place for the EXR management team and senior consultants. No job profiles are in place at the Highveld Coal Mine.
	9.3	Employee profit share	Employee profit share scheme in place which determines profit share scheme for management and employees for motivational purposes.	3	EXR employee profit share scheme has been developed and is being presented to EXR employees. No finalization yet.
	9.4	Leadership	Regular communication from the CEO to communicate JMC events, results, actions and future prospects.	2	Communication irregular, more leadership required.
	9.5	Personality management	Have the BOD analysed the personalities of the team members to play on their strengths and overcome their weaknesses?	1	Done, but not used yet for management purposes.
			SCORE	**2.5**	

iv) Score: Risk Management Pillar

Matrix: Risk management pillar score

5: excellent, 4: good, 3: fair, 2: poor, 1: not achieved

Theme	Task		Description - Purpose - Goals - Objectives	Score	Comments
Step 10. Risk Identification	10.1	Corporate risks	Corporate risks identified relating to: strategic direction, acquisitions, JV partners & shareholders, corporate governance	3	Corporate risks have been identified. These relate to a potentially changing coal market, new acqusitions, jv partners and corporate governance.
	10.2	Mining asset risks	Mining asset risks identified pertaining to geology and exploration, mining, processing, infrastructure, the environment, weather, production performance, health and safety, industrial action, contractors, project completion, project assumptions and operating costs.	4	Operations risks have been defined by EXR management team. There has been no independant verfication. A key operations risk is the poor productivity at the Highveld Coal Mine. Other risks are the delay in the start-up of the Ermelo Coal Mine, contractor non-performance and escalating operating costs.
	10.3	Team risks	Risks relating to skills & company leadership.	2	The lack of skills in engineering at the Highveld Coal Mine and shortage of technical skills in the mining industry are risks.
	10.4	Market risks	Market risk relating to a falling commodity price, which is a function of demand and supply.	4	The market risk is that of a decreasing coal price as a result of global warming, which will lead to a move to alternative energies. Ihowever, the shortage of energy means that in the short to medium term, the future for coal is positive.
	10.5	Legal risks	These risks relating to mining legislation, contracts and host country politics in South Africa for EXR.	3	Legal risks have been identified as those pertaining to uncertain mining legislation in South Africa.
	10.6	Financing risks	Risks relating financing, currency, insurance and participants .	5	The risk of not securing mining finance in the current bouyant minerals market is minimal.
Step 11. Risk Quantification	11.1	Economic value of risk	Have the probability and impact of the corporate, operational, team, market, legal and financial risks been determined? Has a risk ranking been undertaken of high, medium and low risks?	4	The probability and impact of the identified risks have been determined in brainstorming sessions with the team.
	11.2	Risk simulation	Have the risks effects been simulated on the economic model of the company?	3	Risks have been simulated on the economic model of EXR. The company remains cash positive, even with the risks modelled.
Step 12. Risk Management	12.1	Risk management plan	Has a risk management plan been defined for the JMC's high and medium risks?	3	A risk management plan has been developed, but there is no action plan yet.
	12.2	Corporate sustainability	Is corporate sustainability ensured through corporate governance practices, community development initiatives and environmental management?	2	EXR needs to implment more of the required corporate governance practices prior to listing. No community project has been initiated yet. Environmental management practices are good.
			SCORE	**3.3**	

Discussion: EXR business pillars

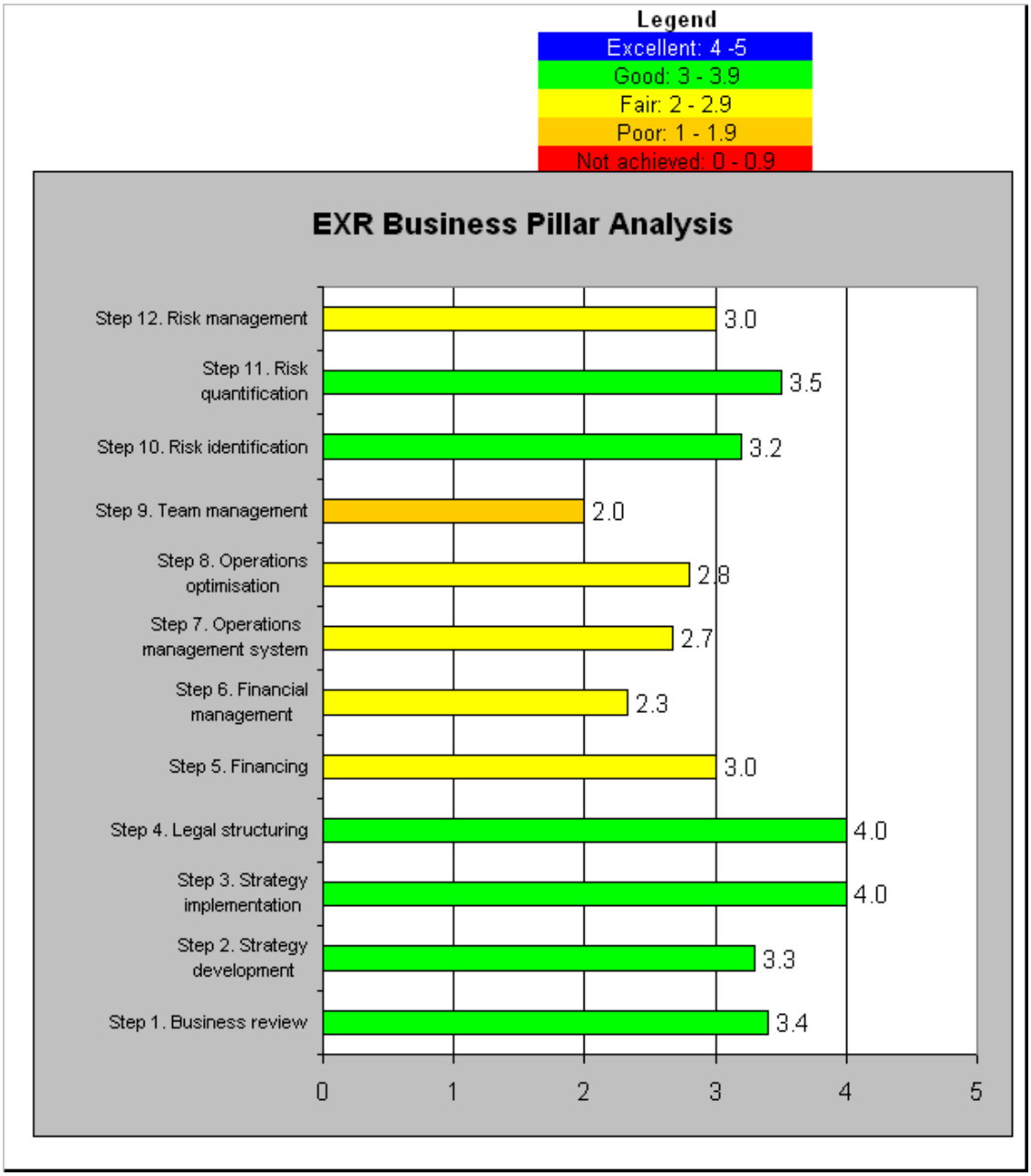


Figure 5.21 EXR business pillar analysis

Strategy development pillar: The EXR team has thoroughly analysed the coal market. Extensive opportunities are available. However, the company cannot participate in the

clean coal technology market. A host of strategic options have been identified and selected .The company now needs to execute the implementation plan. EXR scores 3.6, which is GOOD.

Legal and financial pillar: The holding structure of EXR is very good, ideal for a capital raising campaign. However, it has been difficult for EXR to raise capital to date, and the company is reliant on a successful listing to raise capital. On an operational level, the implementation and buy-in of the budget are critical aspects. EXR scores a 3, which is GOOD.

Operations management pillar: The business processes have been well-identified. Areas that need to be urgently addressed are team management and the management of suppliers. The operations management systems need to improved at an execution level and the team needs to implement the identified optimisation opportunities. EXR scores 2.5, which is FAIR.

Risk management pillar: EXR scores well in most areas of the risk management pillar. The only area of concern is the update of the risk management plan. The company scores 3.3 in this area, which is GOOD.

5.6.3 Score: Financial Performance –EXR

The financial performance of a junior mining company is scored from two areas:

1. The financial statement (Foundation 6) and financially related ratios of EXR.
2. The positioning of the junior mining company against the financial performance of the 20 analysed junior mining companies (Database 4: Financial Performance of Junior Mining Companies)

(The income and costs of EXR are derived currently in Rands, but have been converted to US$ (1$ = R7) to allow for an international comparison.)

i) Score: Financial Statement - EXR

Matrix: Financial statement analysis - EXR

				Shareprice* $	0.13
Income statement ($ mill	year 2	year 1	**Balance sheet ($ mill)**	year 2	year 1
Revenue	15.7	12.9	Current assets	1.4	0.7
Cost of sales	15.0	12.4	Non current assets	5.7	5.0
Gross profit	**0.7**	**0.4**	**Total assets**	**7.1**	**5.7**
Net profit before tax	**1.0**	**0.2**			
Profit/loss for year	**1.2**	**0.1**	Current liabilities	1.4	1.3
Earnings per share ($)	0.01		Non current liabilities	4.3	2.9
			Total liabilities	**5.7**	**4.1**
			Total equity	**1.4**	**1.6**
Cashflows ($ mill)	year 2	year 1	**Ratios**	year 2	year 1
From operating activities	0.7	0.4	Gross profit margin	5%	3%
From investing activities	-5.7	-5.6	Current ratio	1.0	0.6
From financing activities	4.3	4.0	Debt ratio	80%	73%
Cash at year end	-0.4	0.0	PE ratio	11	
			* anticipated shareprice at listing		

Area	Benchmark	EXR	Score
Gross profit margin	Needs to be profitable	increasing profit margin	2.5
Current ratio	> 2 =healthy postion	below 2, poor	1.5
Debt ratio	if >50%, shareholders provide most risk	extremly high gearing	1.5
*hypothetical share price at listing		**Score**	**1.8**

Legend
Excellent: 4 -5
Good: 3 - 3.9
Fair: 2 - 2.9
Poor: 1 - 1.9
Not achieved: 0 - 0.9

The Matrix, financial performance analysis, depicts the income statement, balance sheet and cash flows of the past 2 years of EXR.

- **Income statement**: Income has risen by 21% and gross profit has increased by 75%. The company has made a profit for the year of $1.2 million as opposed to $0.1 million in the previous year. The earnings per share, based on 100 million shares, are $0.01. EXR is not listed yet. At a listing, the share price is anticipated at $0.20/share, and this would hypothetically convert to a PE ratio of 17.

- **Balance sheet:** The total assets have increased by 20% from $5.7 mil to $7.1 million. The total liabilities have increased by 39% from $4.1 million to $ 5.1 million. This has resulted in a reduction of equity from $1.6 million (year 1) to $1.4 million (year 2).

- **Cash flows**: The cash flows from operating activities have increased by $0.3 million. Cash flows from investing activities have remained almost constant at $5.7 million and cash flows from financing activities have increased by $0.3 million. Of significance is that at year end, EXR is cash negative at $0.4 million, which is a carried by a bank overdraft. The company is awaiting payment for its produced coal.

Financial ratios:

- **Gross profit margin:** the intention of any investment is ultimately profitability above risk free investments, such as the money markets. EXR is marginally profitable at 5%, and has improved on its performance in year 1 where it had a profitability of 3%. Ultimately, this is not a satisfactory profitability, but EXR has the benefit of being a young company, and during this phase profitability is not guaranteed. EXR scores FAIR (=2.5) in terms of this ratio.
- **Current ratio:** EXR's current ratio 1 is below the benchmark of 2 (a health ratio). The company scores POOR (=1.5) in terms of this ratio.
- **Debt ratio:** EXR is highly geared at 80%. The shareholders provide most risk if the debt ratio is above 50%. EXR scores POOR (=1.5) in terms of this ratio.

Score – financial statement: EXR's financial statement score is 1.8, POOR. The score is a reflection of the financial performance of the Highveld Mine and its high gearing. The company requires an equity injection to reduce the gearing ratio. In parallel, all efforts are required to improve the profitability of the mine.

ii) Score: Listed Junior Mining Companies versus EXR

In this analysis, the financial performance of EXR is compared to that of the 20 listed junior mining companies in Database 4, Chapter 4.3.3. The analysis is important as it benchmarks EXR to other junior mining companies, particularly the top market performers. Analysed are the ratios of net profit / loss, debt ratios, cash at end year, gross profit margins and PE ratios.

Net profit / loss

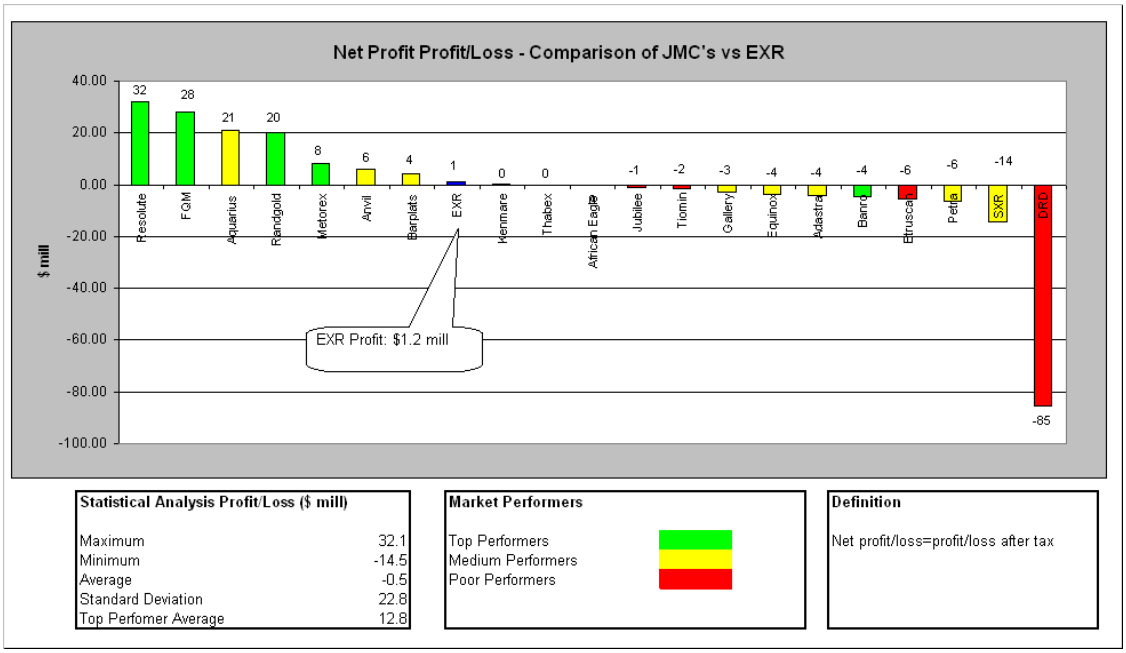


Figure 5.22 Net profit /loss

EXR has a shown a profit of $1.2 million. This places the company in the top 50% of the analysed JMC's, where the bulk of the companies are loss makers. EXR scores FAIR (=2.5) in terms of this ratio.

Gross profit margin

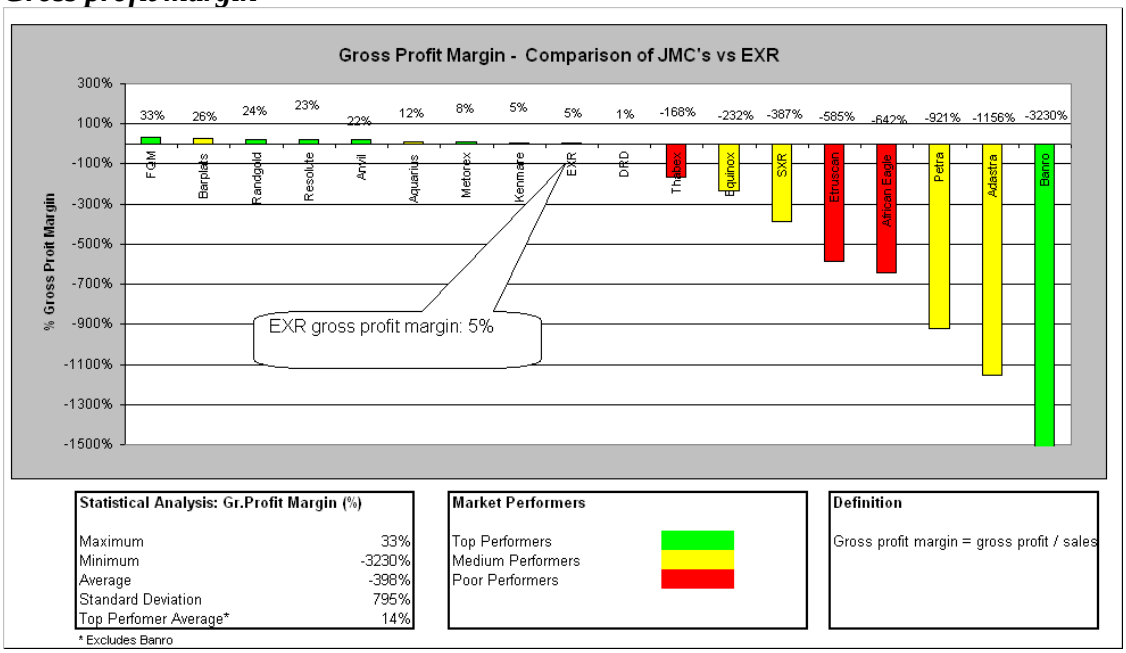


Figure 5.23 Gross profit margin

EXR, with a gross profit margin of 5% lies in the middle of the analysed JMCs. The profitabilities lie between 33% and – 3230%. However, the bulk of the top performers are profitable at an average of 14%. It is only Banro that distorts this picture. Many juniors are not profitable at all. EXR scores FAIR (=2.5) in terms of this ratio.

Debt ratio

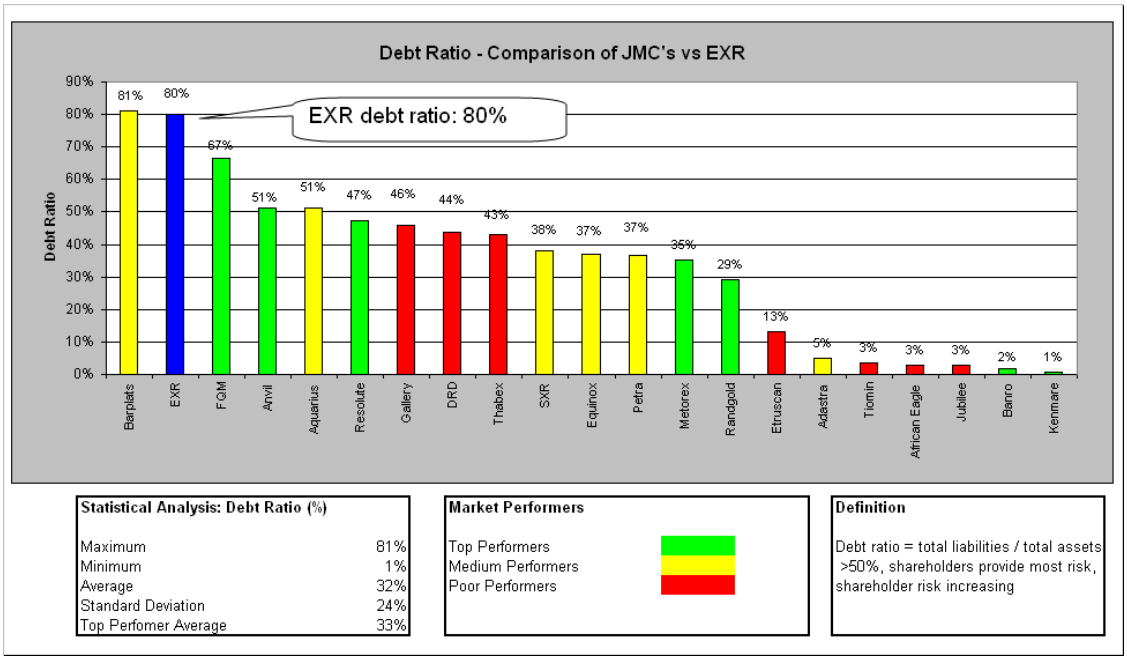


Figure 5.24 Debt ratio

EXR has an extremely high debt ratio at 80%. The top performers have an average debt ratio of 33%, which is well below that of EXR. The high debt ratio is a reflection of EXR having financed the company mainly through debt to date. The team has realized this and is making efforts on its equity capital raising campaign through listing. EXR scores POOR (=1) in terms of this ratio.

Cash end year

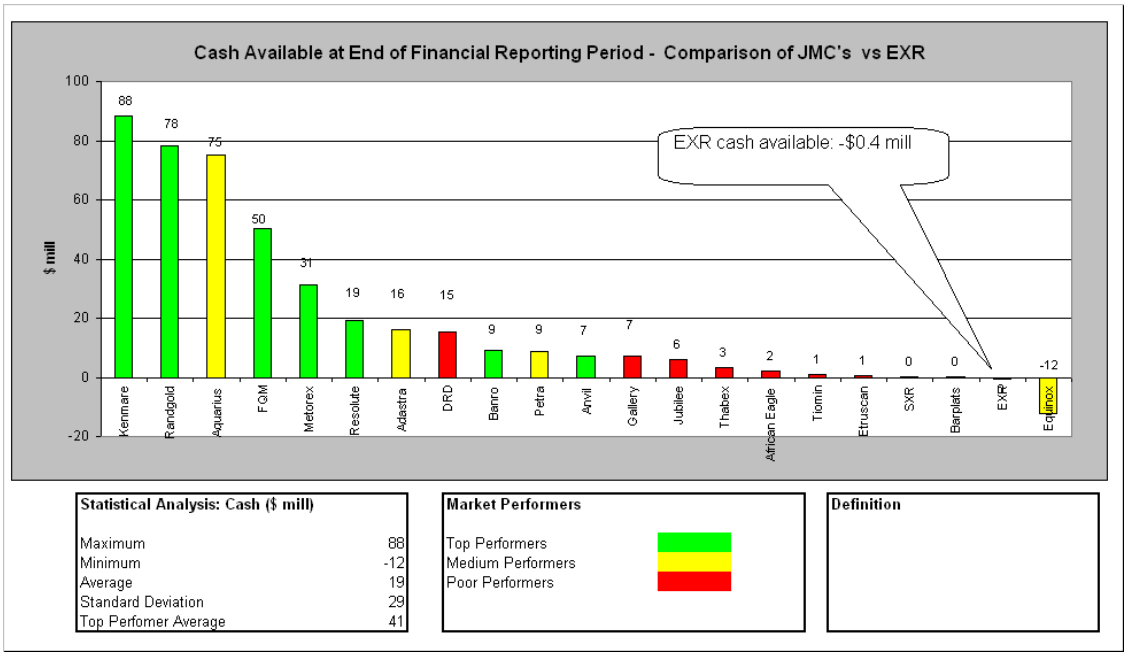


Figure 5.25 Cash end year

EXR is cash negative at the end of the reporting period and is reliant on bank overdrafts and its equity capital raising campaign for continuation and growth. It is also a reflection of EXR awaiting payment from coal produced. The company has no cash reserves and this is a concern. The average for the top market performers is $41 million, implying that the JMC's have significant cash available for mine development. This result is also a reflection of the stage of EXR's company life, which is prior to a listing campaign. This is bound to change after the listing. Until then, EXR scores NOT ACHIEVED (=0.5) in terms of this ratio.

PE ratio

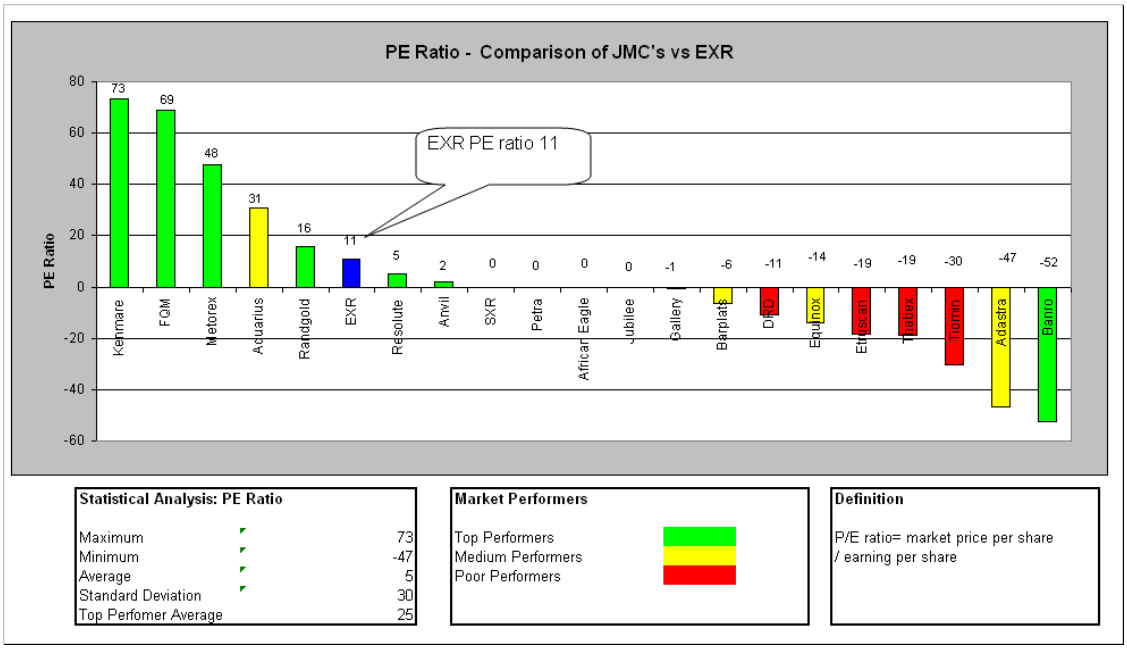


Figure 5.26 PE ratio

EXR is not listed yet, and as such this comparison is merely hypothetical. In Chapter 5.5, Task 5.1 valuation, Matrix 5.1it was calculated that the share price of EXR at a listing would be approximately R0.94/ share. At an exchange rate of R7/$ this equates to US$0.13 / share. EXR represents a potential PE ratio of 11, which is above the average of the twenty JMC's, but below the average of the top performers which is 26. EXR scores FAIR (=2.5) in terms of this ratio.

Score: Analysed JMC's versus EXR: EXR scores 1.6, which is POOR. The score is a reflection of the company's low margin profit, its high debt ratio and low cash reserves in comparison to those of the 20 junior mining companies analysed, in particular the top performers.

Matrix: JMC's versus EXR

Ratio	Average JMC's	Top Perfomers	EXR	EXR Score
EXR vs JMC: Gross profit margin		14%	5%	2.5
EXR vs JMC: Debt ratio	32%	33%	80%	1.0
EXR vs JMC: Cash end period	$19 mill	$40 mill	-$0.4 mill	0.5
EXR vs JMCs: PE ratio	6	25	11	2.5
			Score	**1.6**
		Legend		
		Excellent: 4 -5		
		Good: 3 - 3.9		
		Fair: 2 - 2.9		
		Poor: 1 - 1.9		
		Not achieved: 0 - 0.9		

Discussion: EXR financial performance

The score: Financial Performance of EXR is 1.7, POOR. It is the average of the two scores:

- Score: Financial Statement - EXR: 1.8
- Score: JMC's versus EXR : 1.6

The score is a reflection of the marginal financial performance of the Highveld Mine, the high debt ratio and gearing, and the low cash reserves.

5.7 EXR - Company Score

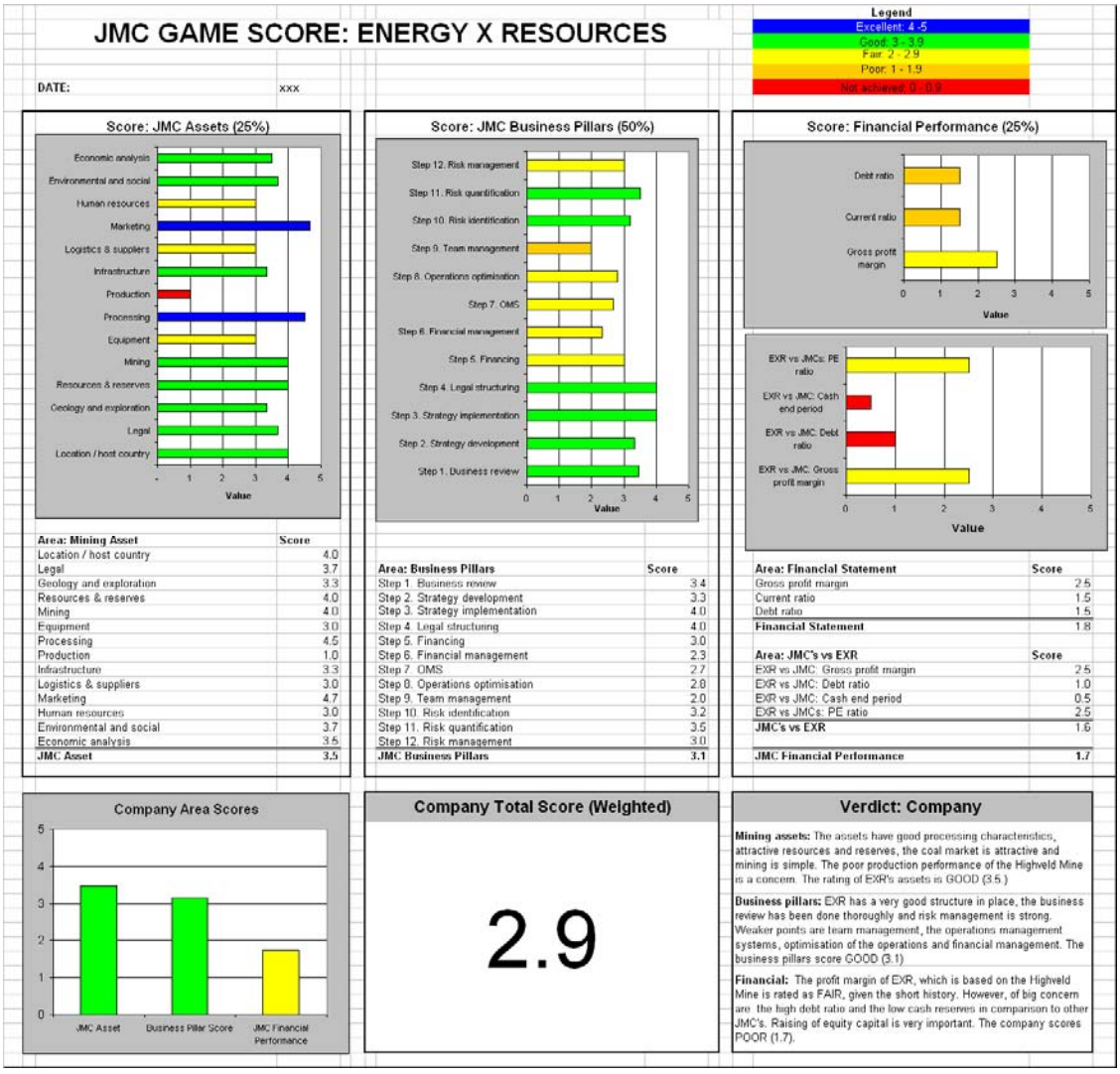


Figure 5.27 EXR company game score

Discussion: Final Game Score

The final game score of EXR is 2.9, which is FAIR. The company can thus be classified as a reasonable investment to investors and the players can rate their company as FAIR.

In summary, the assets of EXR are attractive at 3.5, in particular the Ermelo Project, which is based on highly attractive coal reserves. The Highveld Mine, however, is a marginal asset and needs to be optimised as a matter of priority. The mining assets of EXR are the strongest component of all aspects analysed and scored.

The business pillars of EXR are rated as GOOD, at 3.1. The strongest element in the game plan is the strategic pillar. The team has thoroughly defined the strategy for the company. The tactical elements of the game plan need addressing. The weakest pillar in the game plan is the operations management pillar, which is integral to the success of the Highveld Mine. As can be seen in the game score, the players and investors need to focus here on management of the team, the operations management system, management of risks and financial management.

The financial performance of EXR, with the only operating asset, the Highveld Mine, is rated overall as POOR, at 1.7. The main reasons are the high debt ratio and the poor cash reserves, which are a reflection of the marginal profitability of the Highveld Mine. If no equity capital is injected, the going concern status of EXR may be threatened. The company needs to focus on raising equity capital from the financial markets to improve its balance sheet and bring the attractive Ermelo Project into production as soon as possible.

In summary, EXR has been assessed as an investment opportunity and strong and weak points have been determined. With its strong business pillars, the company has the potential of becoming a winner, if the identified shortcomings are addressed.

6. SUMMARY AND CONCLUSION

6.1 Summary of Chapters

The thesis has sought to develop a game plan for junior mining companies, which mining entrepreneurs and mining investors can use to establish globally competitive mining companies and which will contribute to the growth of a vibrant junior mining sector in South Africa.

In Chapter 1, the game plan approach was introduced, using the games of soccer and chess as examples. Any game is defined by rules, the player, the elements of playing, the definition of winning and scoring, and the game plan for junior mining has to incorporate these aspects. The author believes that the need for a game plan approach in junior mining arises out of the current industry dynamics which constantly change. Any game plan for junior mining needs to be able to be applied to any junior mining company in any commodity and applied to any changing mining market dynamics.

In Chapter 2, the author sought to gain an understanding of the current dynamics of the resources industry. The current dynamics of the resources sector are currently highly favourable for growth. Globally, the resources sector has been affected by technological innovation, changes in government policy and privatisation of state-owned mineral properties, globalisation of capital, the end of apartheid in South Africa, growing environmental concerns, the decreasing mine finding potential in Canada, Australia, the US and South Africa, the effects of September 11, a commodities boom and the resultant growth in exploration, and a lack of skills. In Africa, the dynamics are the growing global importance of Africa which is attracting global investment, growth in gold mining in West Africa, the re-emergence of copper mining in Zambia and the Democratic Republic of Congo, the role model of Tanzania as a shining example and a Chinese invasion of the continent. In South Africa, new mineral legislation and the requirement for black economic empowerment, major mining companies diversifying outside of South Africa, new players in the platinum sector, an extremely well performing bulk commodity sector,

an energy crunch increasing the importance of coal, a challenged junior mining sector and a beneficiation focus are key factors affecting the industry. Despite various challenges, South Africa is the leading mining investment destination in Africa.

The significance of this analysis to the game plan development is that the game plan needs to be generic to cater for constantly changing dynamics of the industry. At any point in time, new factors may emerge at a global, regional or national level, which may affect the business of a junior mining company. The game plan needs to be flexible enough to cater for the constant changes to these dynamics and facilitate a blueprint that will enable a junior mining company to emerge as a winner in any environment.

In Chapter 3, the game plan for the junior mining company was developed. The game plan has a foundation, which represents the rules applicable to the junior mining game. The foundation for the junior mining game is the resources industry cycle, the mining project value chain, the mining project pipeline, the business investment triangle applied to junior mining and financial performance measurement. The player of the game is the junior mining company, which is driven by mining entrepreneurs and investors, with a healthy appetite for the risks and rewards of the industry. The player is defined by its corporate structure, the company strategy, the mining assets, the team and the financial performance. The mining asset of the junior mining company can be an exploration project, a feasibility study, a mine development project or an operational mine.

The goal of the junior mining company is to present an attractive investment opportunity to the market, through projects that have an attractive IRR, to grow the junior mining company to a mid-tier mining company, to have the junior mining company being bought out by a major mining company, and sustainability with regards to internationally accepted environmental, social, community development and corporate governance practices.

Four pillars define the process of playing the game. The strategy development pillar, the legal and financial pillar, the operations management pillar and the risk management

pillar. Each pillar is defined by three steps. There are twelve steps in total. The strategic pillar is by implication strategic, while the legal and financial pillar, the operations management pillar and the risk management pillar are tactical, as they focus on the processes and steps of achieving the strategic objective.

Scoring the game is undertaken by the score matrix, which is completed by the player of the game. The following are scored to provide an overall rating of the junior mining company: the mining assets, the business pillars and the financial performance. The total company score highlights the strengths and weaknesses of the company. Undertaking the process of playing the game iteratively will lead to creating a globally competitive junior mining company.

In Chapter 4, databases were developed for the game plan for purposes of creating references and benchmarks for the player playing the game of junior mining. Databases have been created from the analysis of twenty junior mining companies, practical experiences gained through the author's experiences in mine optimization, and the MSc Eng thesis of the author. In Database 1, strategies of top junior mining companies were presented. In Database 2, simple and complex junior mining deal structures were outlined. Database 3 outlined the financial performance of junior mining companies. In summary, junior mining companies are mainly loss makers and the game is about capital appreciation rather than profitability. In Database 4, the operations management system was introduced. The OMS is the management system required to maximize the performance of the mining asset through effective measurement. Database 5 outlined typical mine optimization opportunities in mining, processing, engineering, financial, procurement and human resources functions, and is applicable to any mining operation. Database 6 outlined the disciplines and experiences of junior mining company teams. Team management concepts constitute Database 7. In Database 8, generic risks relating to mining projects were described and classified into technical, economic and human categories. The final database, Database 9 incorporated corporate sustainability in terms of corporate governance practices, community development projects and environmental management of selected junior mining companies.

Chapter 5 entailed playing the game of junior mining, using the case study of the hypothetical junior mining company player, Energy-X Resources (EXR). EXR has a medium sized coal mining operation, a feasibility study and two exploration projects and is intent on listing on a foreign stock exchange in order to raise equity capital and raise its profile for further acquisitions. Chapter 5 is an integration of the game plan design, drawing on the databases developed and catering for the current dynamics of the resources industry. For each game plan pillar, simple game plan models and matrices were introduced and used. Finally, the company score is determined for EXR using the game plan score matrix. The score highlights strengths and weaknesses and creates a benchmark value for EXR as an investment opportunity.

In Chapter 6 a summary of the thesis is presented, as well as a generic game plan model, in the form of a manual and a fold-out model, which can be applied to any junior mining venture.

6.2 A Game Plan Model for Junior Mining Companies

This chapter entails the presentation of a generic game plan model for junior mining companies in the form of a manual. It needs to be read in conjunction with the game plan model displayed in the poster in Appendix F. The author believes the model needs to be laid out, similar to a chess board, or the game Cashflow 101[(2)], where the player can see all the game plan elements holistically. In essence, this chapter represents the manual for any game plan to be developed for any junior mining company in any commodity.

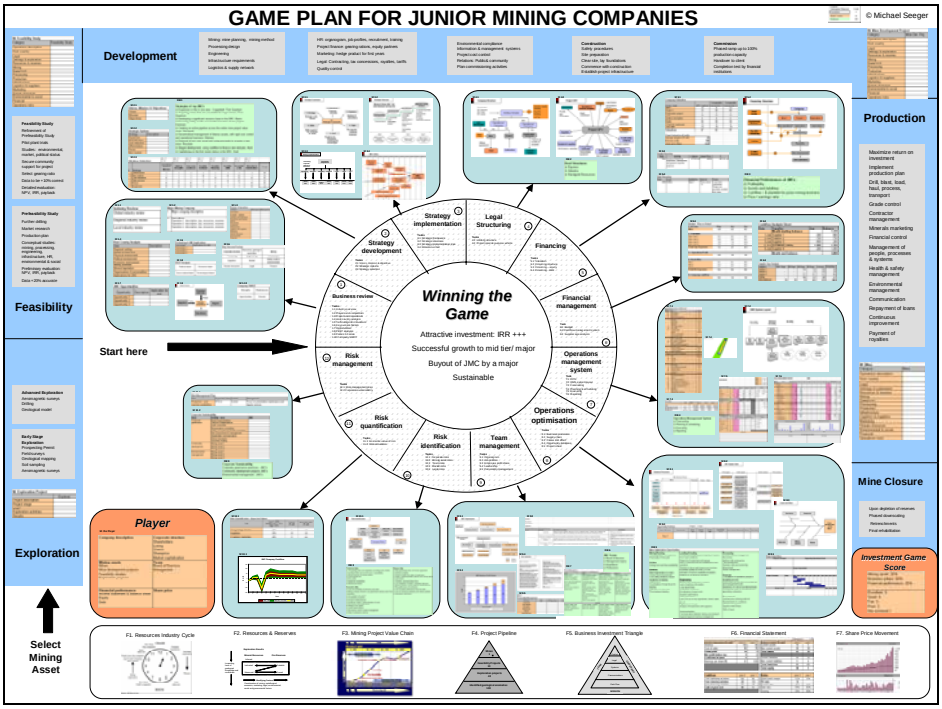
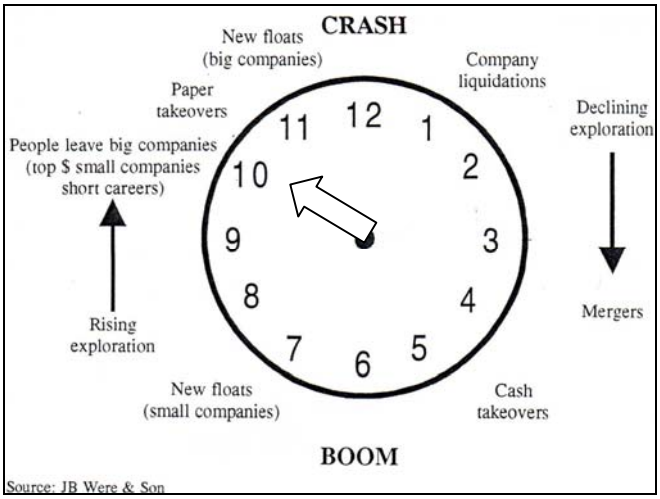


Figure 6.1 Game plan model for junior mining companies

The game plan has foundations, a player, mining assets, the four business pillars with steps, tasks, models and matrices and a method of scoring the game.

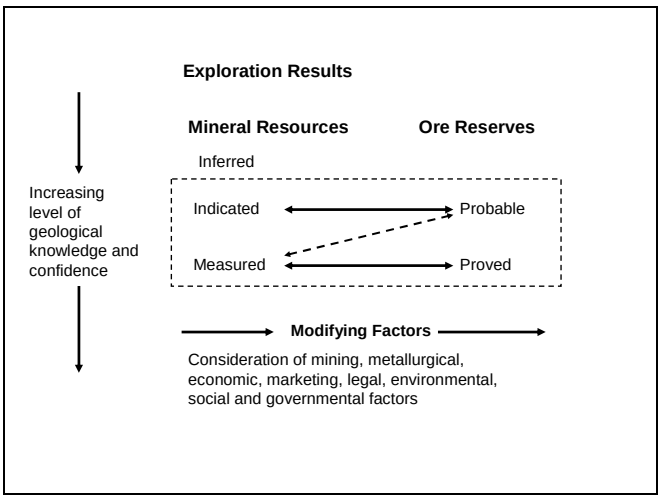
6.2.1 The Foundations

The foundations represent the rules of the junior mining game. Foundation 1 is the exploration clock of Heffernan and depicts the boom and bust cycle in the resources industry. Currently, the resources sector is in a boom cycle and the clock is positioned at 10 o'clock.



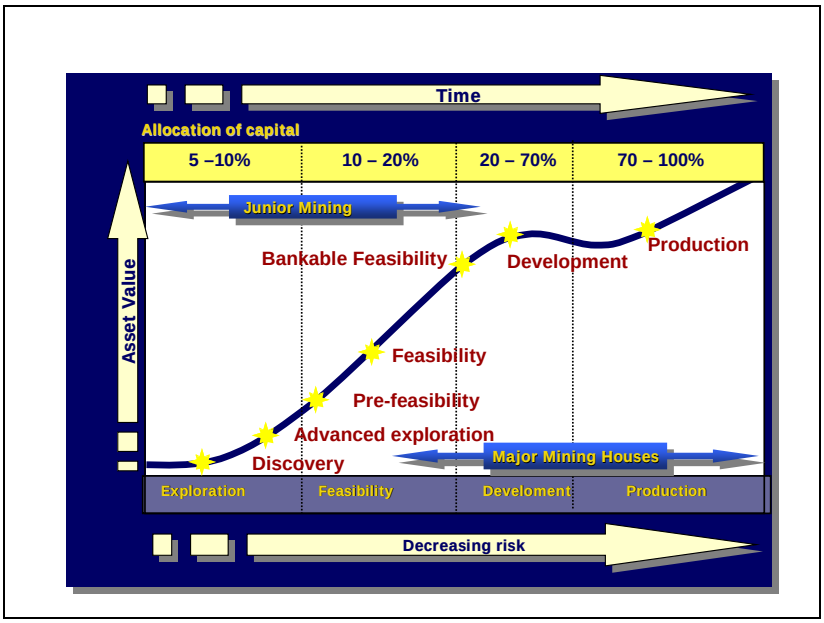
Foundation 1: the exploration clock

Foundation 2 is the concept of resources and reserves, defining inferred, indicated and measured resources and the modifying factors leading to probable and proved reserves.



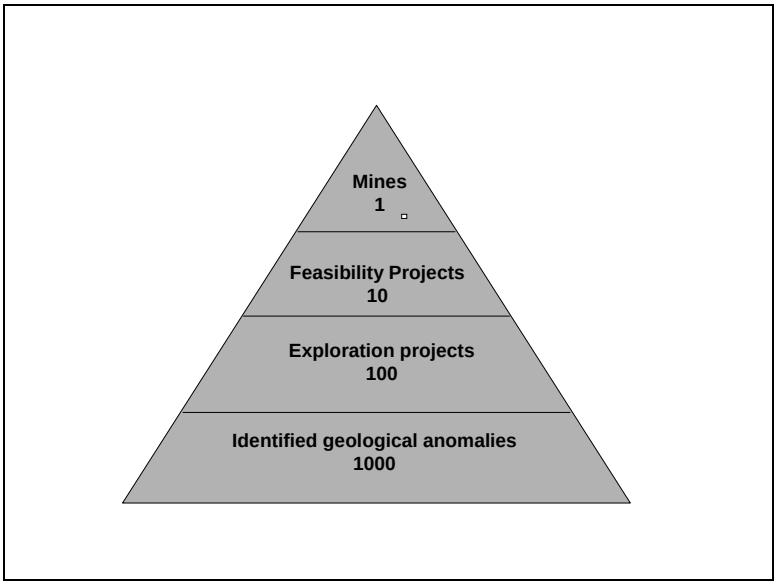
Foundation 2: resources and reserves

Foundation 3 is the mining project value chain. It lays out the relationship of junior and major mining companies with regards to asset value, time, allocation of capital, risk and the activities of exploration, feasibility, development and production.



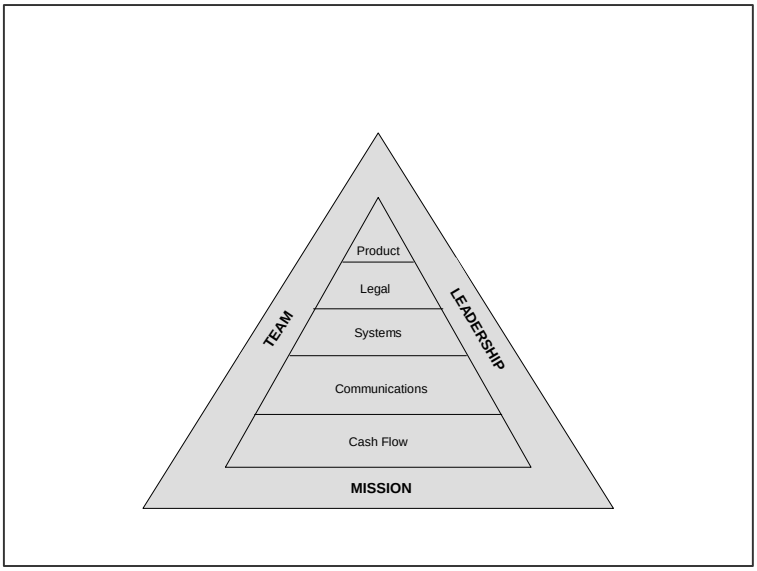
Foundation 3: mining project value chain

Foundation 4 is the generic project pipeline, according to which 1000 identified geological anomalies lead to 100 exploration projects, which will lead to 10 feasibility studies. At the end, this will culminate in one mine. Junior miners can position their own mining asset portfolio according to this pipeline to determine the chances of developing a mine.



Foundation 4: project pipeline

Foundation 5 is the business investment (BI) triangle applied to junior mining. Every business needs a mission, a team and leadership. Cash flow, communication, systems, legal contracts and, finally, the product make up the elements of the BI triangle.



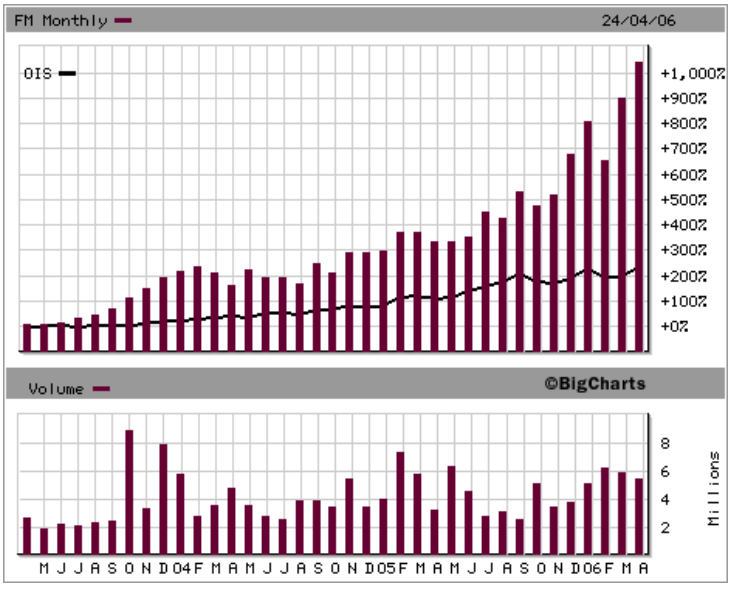
Foundation 5: business investment triangle

Foundation 6 is the financial statement, which is made up of the income statement, the balance sheet, cash flows and financial ratios. This is the financial score card for the junior mining company.

				Shareprice	1.00
Income statement (R mill)	year 2	year 1	**Balance sheet (R mill)**	year 2	year 1
Revenue	100	80	Current assets	10	5
Cost of sales	90	75	Non current assets	35	25
Gross profit	**10**	**5**	**Total assets**	**45**	**30**
Net profit before tax	**5**	**2**			
Profit/loss for year	**4**	**1**	Current liabilities	30	20
Earnings per share (R)	0.1	0.02	Non current liabilities	5	5
			Total liabilities	**35**	**25**
			Total equity	**10**	**5**
Cashflows	year 2	year 1	**Ratios**	year 2	year 1
From operating activities	100	80	Gross profit margin	10%	6%
From investing activities	-20	-10	PE ratio	10	
From financing activities	10	10	Current ratio	0.3	0.3
Cash at year end	**10**	**5**	Debt ratio	78%	83%
			Gearing	33%	50%

Foundation 6: the exploration clock

Foundation 7 is share price movement. Junior mining is about market sentiment and the share price is a reflection of the market perception of the mining assets, the team, and the financial performance of the junior mining company. An increasing share price represents positive market sentiment.



Foundation 7: the exploration clock

6.2.2 The Player

The player is the junior mining company (JMC). The correct description of the player is a general description of the company, the corporate structure, the mining assets, the team, financial performance and the share price.

Company description	**Corporate structure** Shareholders Listing Shares Shareprice Market capitalisation
Mining assets Mines Mine development projects Feasibility studies Exploration projects	**Team** Board of Directors Management
Financial performance Income statement & balance sheet Equity Debt	**Share price**

Matrix – the player

6.2.3 The Mining Assets

The mining asset of a junior mining company is either one or multiple exploration projects, feasibility studies, mine development projects or operational mines.

Exploration: An exploration project can be classified into early stage exploration and advanced exploration. Early stage exploration entails securing the Prospecting Permit, conducting field surveys, geological mapping, soil sampling and aeromagnetic surveys. Advanced exploration entails conducting aeromagnetic surveys, drilling and compiling the geological model. Exploration projects are described in the matrix below:

M. Exploration Project	
	Project
Project description	
Project stage	
Legal	
Exploration activities	
Results	

Matrix – Exploration Project.

Feasibility: The feasibility phase of a mining asset is the pre-feasibility study and the feasibility study. The pre-feasibility study entails further drilling, conducting market research, compiling the production plan and undertaking conceptual studies in mining, processing, engineering, infrastructure, human resources, environmental and social aspects of the project. This study concludes with preliminary economic evaluation in terms of NPV, IRR. The study has a margin of error of 20%.

The feasibility study is a refinement of the pre-feasibility study. It encompasses executing pilot plant trials and conducting detailed environmental, market, political status studies. A major aim is to secure community support for the project. A gearing ratio is selected for the project financing campaign. New data is incorporated into the economic model and the margin is reduced to 10%.

Development: Mine development is an extensive, multi-disciplinary process of developing all the detailed technical, commercial, human resources and legal processes

of the mine. Once these have been completed and project finance has been raised, the construction process commences with site preparation and the establishment of the mine infrastructure. Commissioning commences in a staged ramp up phase once the entire mining project has been established

Production: Once the mine is fully in production, the focus is on maximizing return on investment, implementing the production plan, and managing systems, processes and people to optimize the performance of the mining asset. The mine will close in a staged manner once all the reserves have been mined out. The matrix below is used to describe mining assets in a feasibility, mine development or production stage

M: Feasibility Study

Category	Feasibility Study
Operations description	
Host country	
Legal	
Geology & exploration	
Resources & reserves	
Mining	
Equipment	
Processing	
Production	
Infrastructure	
Logistics & suppliers	
Marketing	
Human resources	
Environmental & social	
Financial	
Operations risks	

Matrix – Feasibility, mine development, mine

6.2.4 Playing the Game: The Business Pillars

Playing the game is done by sequentially following the 12 steps of the four business pillars: strategy development, legal and financial, operations management and risk management. The first pillar is strategic, the remaining pillars are tactical. Each pillar is made up of 3 steps and each step is made up of specific tasks. Tasks are executed by completing specific model and matrices.

i) Strategy Development Pillar

In this pillar, a business review of the resources specific sector is conducted (Step 1), a strategy is developed (Step 2) and strategy implementation plan is mapped out (Step 3).

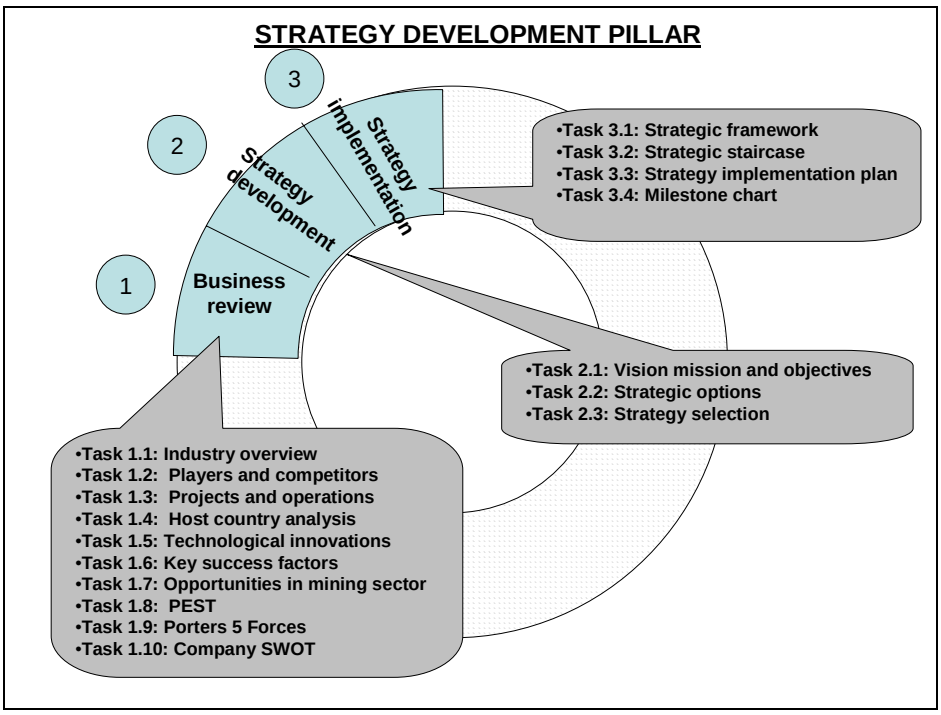


Figure 6.2 Strategy development pillar

Step 1: Business Review

To acquire a sound understanding of the business the external and internal business environments are analysed in ten tasks.

Task 1.1 Global, regional and local industry overview review: Overview of the applicable resource industry in a global, regional and local context. The associated matrix M 1.1 uses short, bullet-point summaries of the global, regional and local resources sectors.

M 1.1
Global industry review
Regional industry review
Local industry review

Matrix 1.1 Industry overview

Task 1.2: Players and Competitors: Understanding and description of major and junior miners in the game that compete with the company: major mining companies are described using Matrix 1.2. Junior mining companies are described using Matrix – the player.

M 1.2	
1	**Company description**
2	**Operations** Operation 1: description, tpa, resources, reserves Operation 2: description, tpa, resources, reserves Operation n: description, tpa, resources, reserves

Matrix 1.2 Players and competitors

Task 1.3 Typical Projects and Operations: Types of operations applicable to the commodity are determined and classified into exploration projects, feasibility studies, mine development projects and mines. Descriptions are given of geology, exploration activities, resources and reserves, mining, processing, production, infrastructure, logistics and suppliers, marketing, human resources, SHEQ and financial data.

M 1.3
Projects & Operations

Category	Mine type A	Mine type B
Description		
Example - operations		
Geology and exploration		
Resources and reserves		
Mining		
Processing		
Production		
Infrastructure		
Logistics and suppliers		
Marketing		
Human resources		
Environmental		
Financial		

Matrix 1.3 Projects and operations:

Task 1.4 Host Country Analysis: Analysis of the host countries of the JMC's projects; implications for the JMC determined.

M 1.4

Area	Description
Regional setting	
Social environment	
Physical environment	
Political environment	
Economic environment	
Mining activities	
Mineral legislation	
Organisations & personalities	
Implications for JMC	

Matrix 1.4 Host country analysis

1.5 Technological innovations: A review of technological trends pertaining to the commodity market and implications for the JMC.

M 1.5

Technology	Implications for JMC
Technology 1	
Technology 2	
Technology 3	

Matrix 1.5 Technological innovations

1.6 Key success factors: Determine key success factors for the JMC pertaining to corporate structure, resources, financing, mining, processing, engineering, infrastructure, suppliers, market, SHEQ, human resources and legal structures.

M 1.6		
Corporate structure	Resources, geology & exploration	Mining
Processing	Engineering	Infrastructure
Suppliers	Market	Safety, health & environmental
Human resources	Legal	Finance

Matrix 1.6 Key success factors

1.7 Opportunities: Listing of local and international opportunities for the applicable resources sector and implication for the JMC.

M 1.7		
Opportunity	Description	Implication for JMC
Opportunity 1		
Opportunity 2		
Opportunity 3		

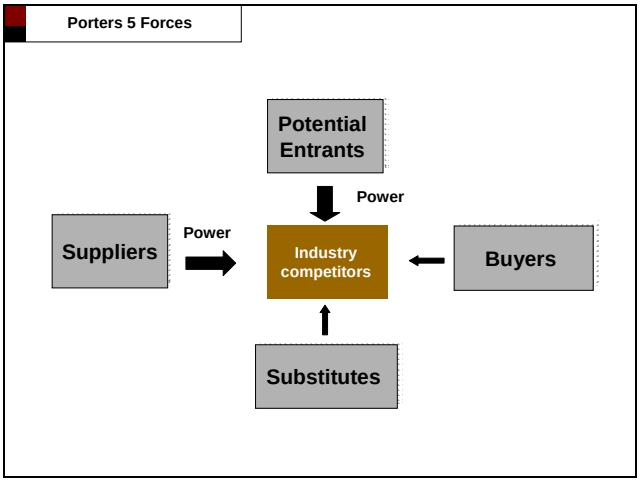
Matrix 1.7 Key success factors

1.8 PEST Analysis: An analysis of political, economic, socio-cultural and technical environments of the JMC.

M 1.8	
Political future	Economic future
Socio cultural future	Technological future

Matrix 1.8 PEST Analysis

1.9 Porters 5 Forces: An analysis of the five forces interacting on the resources sector: suppliers, potential entrants, buyers, substitutes and industry competitors. Where does the power lie and what are the implications for the JMC?



Model 1.9 Porters 5 forces

1.10 Company SWOT: Determine strengths, weaknesses, opportunities and threats for the JMC.

M 1.10	
Strengths	Weaknesses
Opportunities	Threats

Matrix 1.10 Company SWOT

Step 2: Strategy development

In three tasks, a strategy is developed, scrutinised and selected in this step, following the development of company vision, mission and objectives.

2.1 Vision, mission and objectives: Vision, mission and objectives of JMC defined, based on market opportunities.

M 2.1	
Vision	
Mission	
Objectives	

Matrix 2.1 Vision, mission and objectives

Task 2.2 Strategic options: Strategic options for the JMC developed, in alignment with industry analysis and company SWOT. Strategies defined for expansion, diversification, cost reduction, differentiation, focus and new market opportunities.

M 2.2	
Strategy	Description
Expansion:	
Diversification:	
Cost reduction:	
Differentiation:	
Focus:	
New market:	

Matrix 2.2 Strategic options

Task 2.3 Strategy selection: Strategic options ranked and selected for the junior mining company, based on consistency with mission, building on strengths, overcoming weakness, technical and financial feasibility, skills availability, acceptable risk and attractiveness to stakeholders.

M 2.3

		yes = 1 no = 0	yes = 1 no = 0	yes = 1 no = 0	yes = 1 no = 0	yes = 1 no = 0	yes = 1 no = 0	yes = 1 no = 0	yes = 1 no = 0	
#	Strategy	Consistent vision & Mission	Build on strengths	Overcome weakness	Feasible: technical	Feasible: financing	Feasible: skills	Acceptable risk	Attractive to stakeholders	Total
2	Divesification	1	1	1	1	1	1	1	1	**8**
6	New market	1	1	1	0	1	0	0	1	**5**
3	Cost reduction	0	1	1	1	0	1	0	0	**4**
4	Differentiation	1	0	1	0	1	0	0	1	**4**
5	Focus	0	0	0	1	1	1	1	0	**4**
1	Expansion	0	0	0	1	0	1	1	0	**3**

Matrix 2.3 Strategy selection

The database, from which to draw data for Step 2, strategy development, is Database 1, which summarizes the strategies of top JMC's and provides an opportunity for benchmarking against those of market winning JMC's.

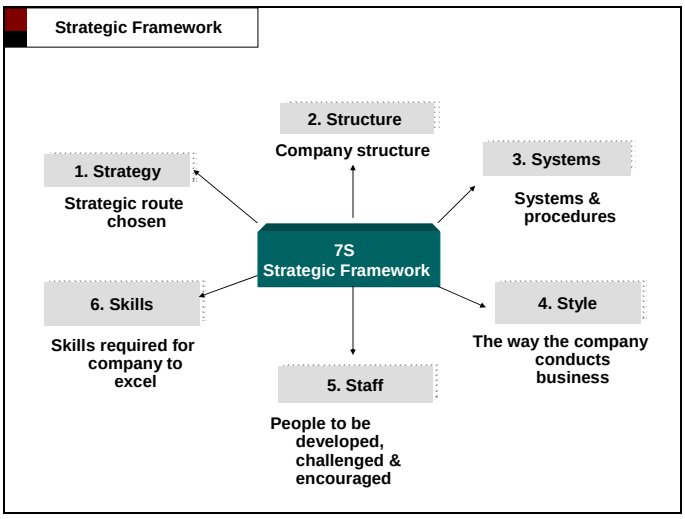
DB 1
Strategies of top JMC's ▯ Expansion in the in one area - Copperbelt: First Quantum ▯ Acquiring mines that are unsuitable for major miners: First Quantum ▯ Developing a significant resource base in the DRC: Banro ▯ Focusing solely on the successful execution of one project: Kenmare ▯ Creating an active pipeline across the entire mine project value chain: Randgold ▯ Decentralized management of diverse assets, with rigid cost control and operational leanness: Metorex ▯ Disposal of non core asset and using proceeds to acquire a new mine: Resolute ▯ Staged development, using cashflow to finance new ventures: Anvil ▯ Capitalising on the first mover status in the DRC: Anvil

Database 1: Strategies of top JMC's

Step 3: Strategy Implementation

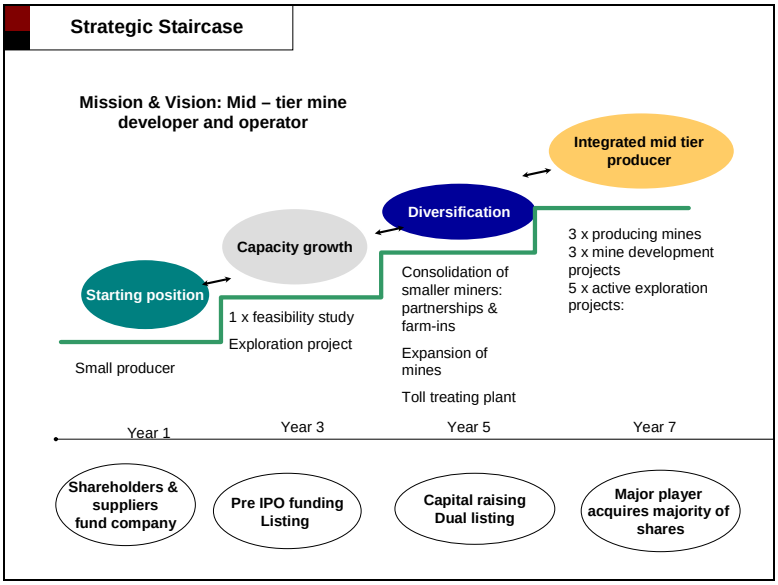
In four tasks, a strategy implementation plan is established using the strategic framework, the strategic staircase, the strategy implementation plan and the milestone chart.

Task 3.1 Strategic framework: Development of the 7s strategic framework which outlines the interaction of strategy, structure, systems, style, staff and skills.



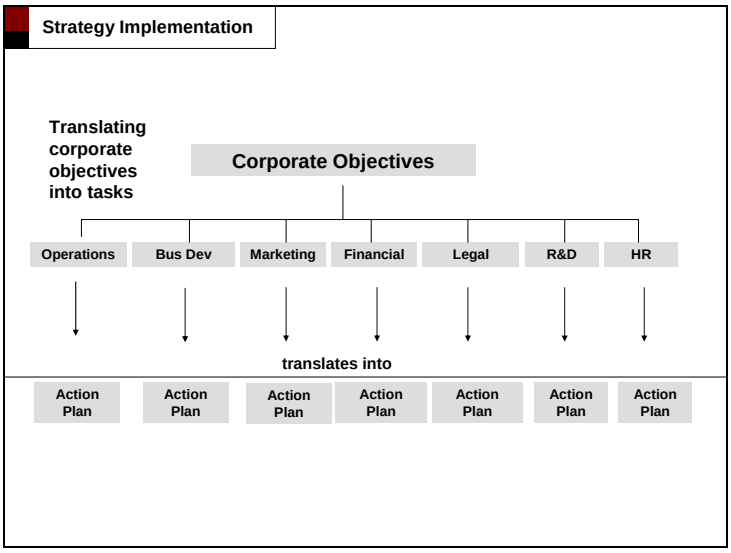
Model 3.1 Strategy selection

Task 3.2: Strategic staircase - 7 year plan: Development of a strategic staircase which provides an overview for the major strategic steps in relation to a time line and provides a reference to capacities required.



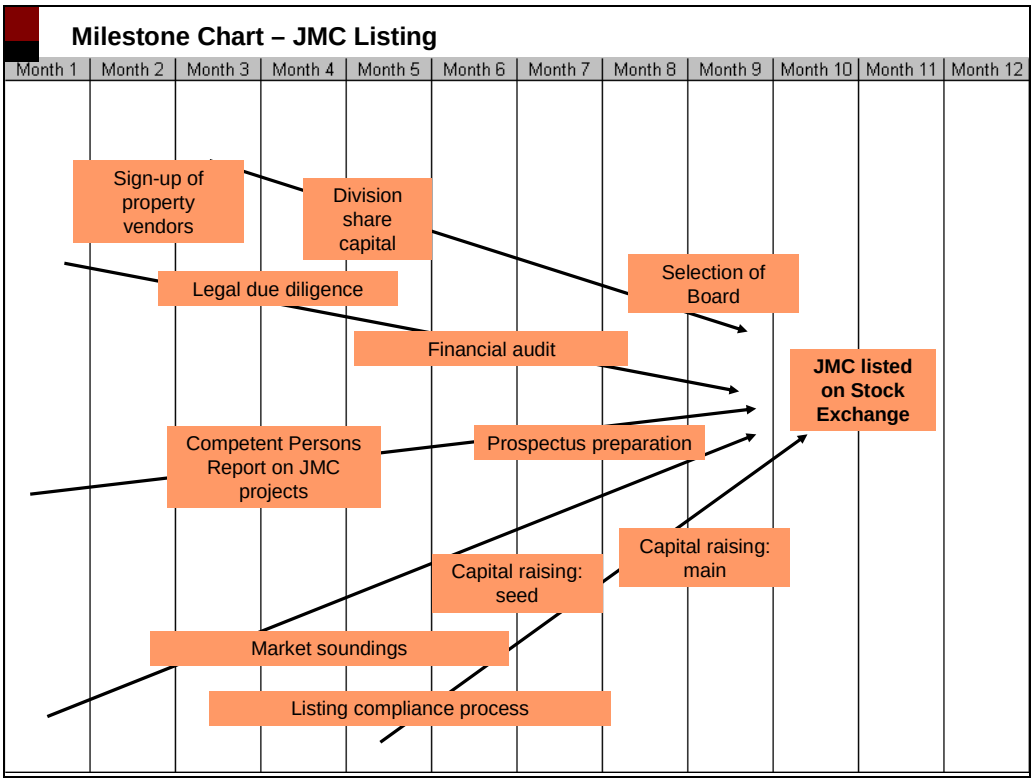
Model 3.2 Strategic staircase

Task 3.3 Strategy implementation plan: Presentation of an implementation plan that translates corporate objectives into tasks and action plans for operations, business development, marketing, financial, legal, research and development and human resources.



Model 3.3 Strategy implementation

Task 3.4 Milestone chart: Development of a high-level milestone chart highlighting core activities and time lines for the team.



Model 3.4 Milestone chart

ii) Legal and Financial Pillar

In this pillar the legal deal structure is reviewed (Step 4), the equity and debt financing campaign is developed (Step 5) and financial management is dealt with (Step 6).

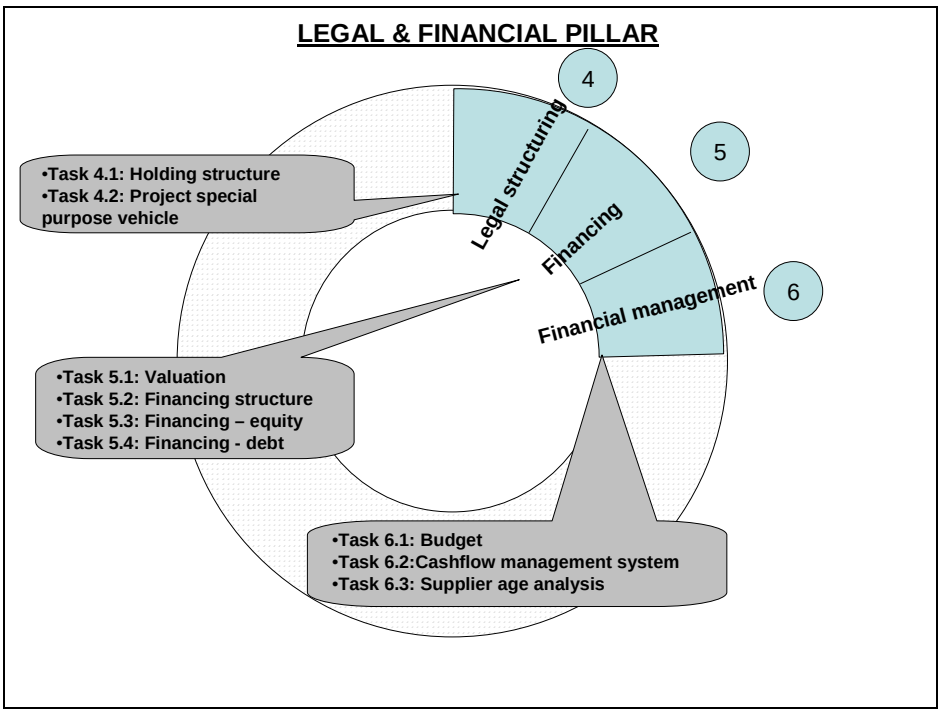
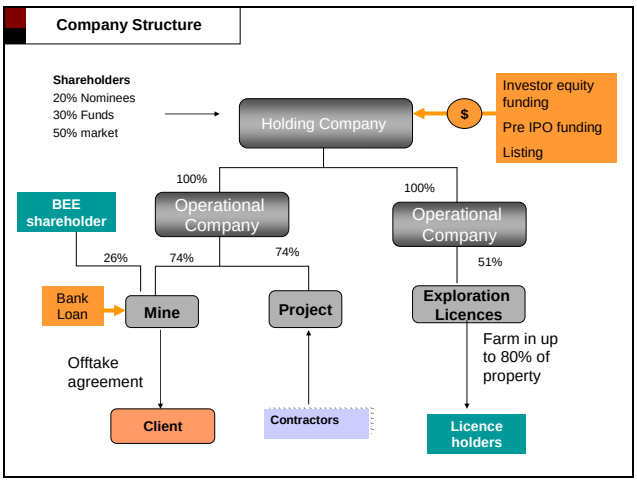


Figure 6.3 Legal and financial pillar

Step 4: Legal Structuring

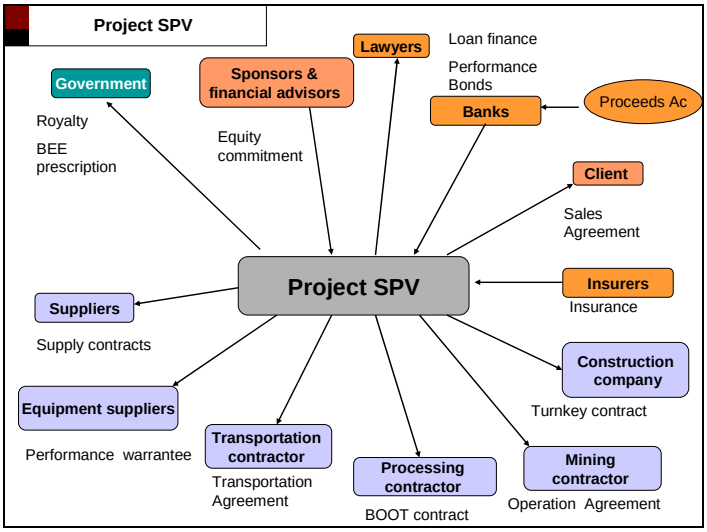
In two tasks, the holding structure is developed for the JMC and a project specific vehicle is constructed for the project.

Task 4.1 Holding structure: Development of optimal holding and operational structure for the JMC, which will facilitate funding, participation of investors at various levels, BEE and shareholder value.



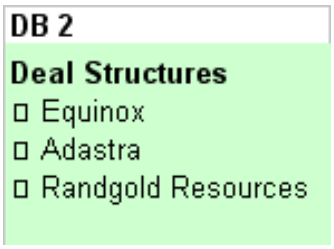
Model 4.1 Company structure

Task 4.2 Project Special Purpose Vehicle (SPV): Project SPV for JMC's project set up in a manner that is clear and facilitates value. Outline project relationship to project sponsors, financiers, advisors, suppliers, equipment OEMs, the market, insurers, and the host government.



Model 4.2 Project SPV

The database, from which to draw data for Step 4 is Database 2. It displays simple, medium and complicated deal structures for the companies Equinox, Adastra and Randgold Resources and serves as a benchmark for setting up a structure for the JMC playing the game.



Database 2: Deal structure

Step 5 Financing

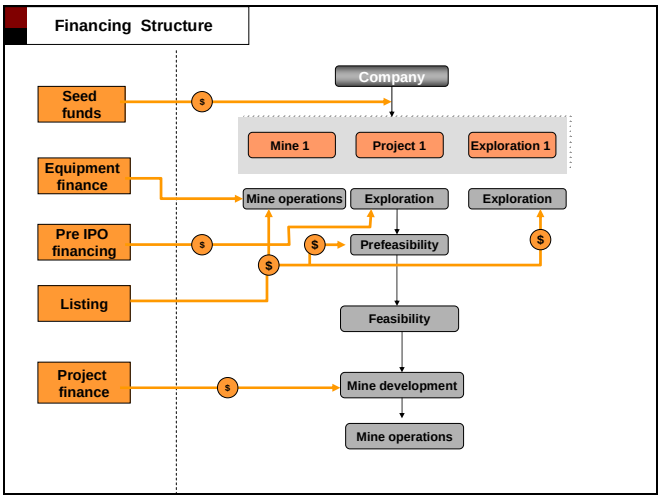
This step requires a company evaluation to be undertaken, a financing structure to be mapped out and details of equity and debt financing to be discussed.

Task 5.1 Valuation: Company valuation process undertaken. The foundation consists of the project NPVs and comparable market transactions. Undertake 2 - 3 different company valuations and average to determine company value. To be included are exploration costs, cash, equity, debt, surface stockpiles and overheads.

M 5.1			
Company Valuation			
Asset / debt	NPV method	Comparable transaction 1	Comparable transaction 2
Mine 1	10	5	10
Project 1	10	30	60
Exploration project	2	2	2
Cash	10	10	10
Surface stockpiles	0	0	0
Equity	30	30	30
Corporate overheads	-5	-5	-5
Total debt	-10	-10	-10
Valuations	**47**	**62**	**97**
Final Valuation (R mill)			
Average valuation (R mill)	**69**		
# shares (mill)	**100**		
share price (Rps)	**0.69**		

Matrix 5.1 Company valuation

Task 5.2 Financing structure: JMC's financing clearly structured to cater for various project stages and facilitate ease of financing.



Model 5.2 Financing structure

Task 5.3 Financing equity: Equity financing activities in place to secure risk capital for the JMC. Equity financing processes relating to the JMC listing on a stock exchange defined: competent person's report, financial audit, legal audit, prospectus, marketing material. JMC ready to pursue listing route.

M 5.3
Equity Financing

Date	Activity	Capital raised	Purpose	Process
2002	Pre IPO seed financing	R 6 mill	Proceeds used to set JMC up for listing	Issue 60 mill shares at 10c.share to Nomad

Matrix 5.3 Financing equity

Task 5.4 Financing debt: Debt financing processes in place with repayment, interest, and general terms that facilitate company growth. Debt financing process understood.

M 5.4
Debt Financing

Date	Loan	Institution	Interest	Terms
2005	R298m	Bank 1	Prime minus 1%	4 year term Guarantees Pledge over proceeds received from sales

Matrix 5.4 Debt financing

Step 6 Financial Management

Financial management is critical to the successful management of a JMC. Required are simple tools for budgeting, cashflow management and supplier age analysis.

Task 6.1 Budget: Accurate, ambitious operational budget with realistic targets.

M 6.1
Budget - Plan vs Actual

1. Income	Plan	Act	Var
Mine	**6.0**	**6.5**	**0.5**
2. Expenses			
Ops cost 1	0.2	0.2	0.0
Ops cost 2	0.5	0.5	0.0
Ops cost 3	2.0	1.5	-0.5
Ops cost 4	2.5	2.5	0.0
Total Ops Expenses	**5.2**	**4.7**	**-0.5**
3. Operations Profit			
	0.8	**1.8**	**1.0**
4. Headoffice			
HQ 1	0.1	0.1	0.0
HQ 2	0.2	0.2	0.0
HQ 3	0.1	0.1	0.0
Total HQ Expenses	**0.4**	**0.4**	**0.0**
5. Company cashflow			
	0.4	**1.4**	**1.0**

Matrix 6.1 Budget

Task 6.2 Cashflow management system: Analysis of cashflows (inflow and outflow), to allow for proper management of cash in the business.

M 6.2
Cashflow Analysis Sheet

Date	Supplier	Jan	Balance
	Month starting balance		*1,000*
1-Jan	Supplier 1	-200	800
2-Jan	Supplier 2	-100	700
3-Jan	Supplier 3	-500	200
4-Jan	**PAYMENT Utility**	**1,000**	**1,200**
5-Jan	Supplier 4	-200	1,000
	Month end balance		**1,000**

Matrix 6.2 Cashflow management system

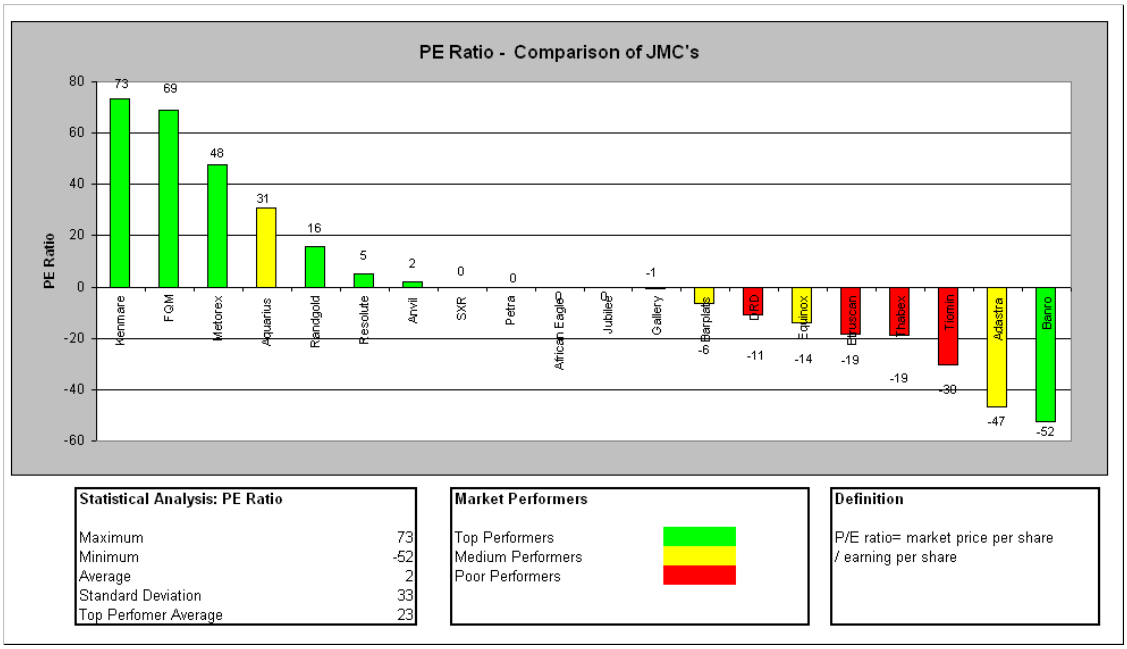
Task 6.3 Supplier age analysis: Analysis of JMC creditors for 120, 90, 60 and 30 days to provide overview of cash flow outflows.

M 6.3
Supplier Age Analysis

Supplier	120+ Days	90 Days	60 Days	30 Days	Current	Total Due
Supplier 1		-	0.5	1.5	0.9	**2.9**
Supplier 2	-	-	-	1.5	2.0	**3.5**
Supplier 3	-	-	0.1	0.1	0.1	**0.3**
TOTAL	-	-	**0.6**	**3.1**	**3.0**	**6.7**
PERCENTAGE :	**0%**	**0%**	**9%**	**46%**	**45%**	**100%**

Matrix 6.3 Supplier age analysis

Database 3 is a review of the financial performance of the twenty analyzed junior mining companies. Analyzed were profitability, assets and liabilities, the debt ratio, cashflow and the PE ratio. This database forms an easy method to compare the financial performance of the JMC to that of the analyzed juniors.



Database 3. Financial performance of JMC's

iii) Operations Management Pillar

In this pillar the focus is on optimising the performance of the mining asset through the effective management of systems, processes and people. An effective operations management system is developed in Step 7. In Step 8, the focus is on optimising the performance of the mining asset. Step 9 is effective team management.

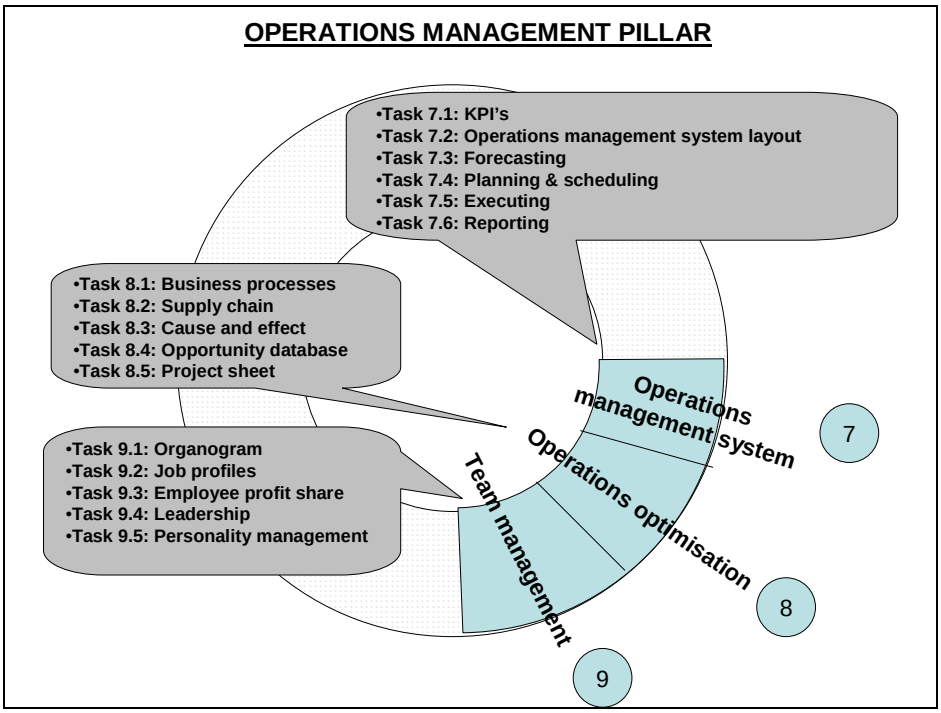


Figure 6.4 Operations management pillar

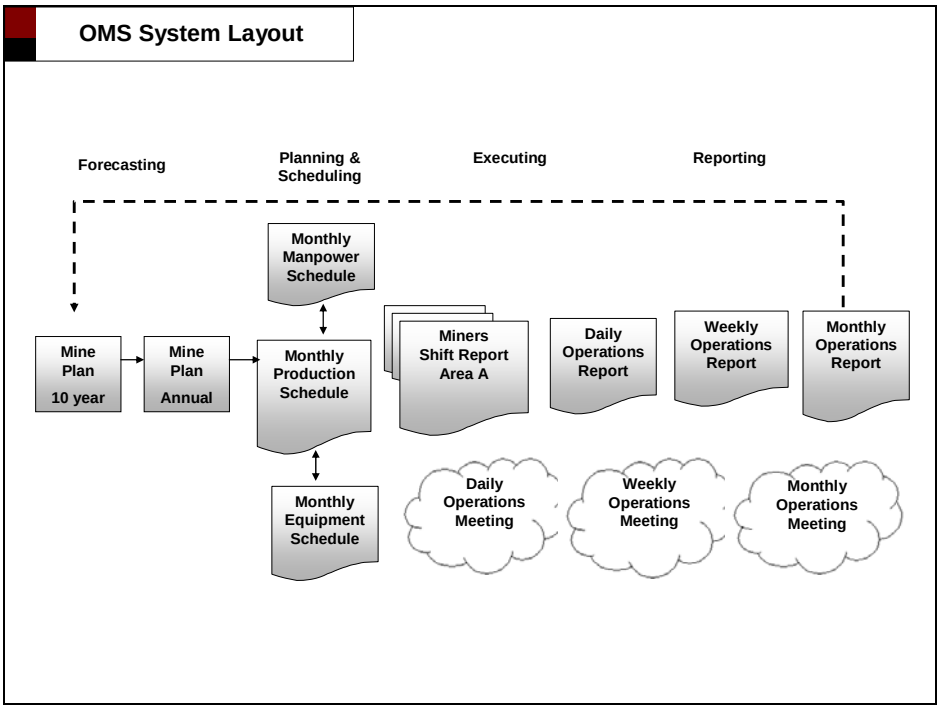
Task 7.1 KPIs: Have the operational KPIs for safety, mining, engineering, processing, transportation, quality, manpower been identified?

M 7.1
Key Performance Indicators

Dept	KPI	UoM
Safety	Accidents	#
	Incidents	#
	Cost of occurance	#
Mining	Drilling	m
	Blasting	m3
	# loads	#
	OB softs hards	m3
	OB Softs	m3
	Total waste	m3
	Coal	**tons**
	Tons / truck/shift	
	m3/ truck/ shift	
Eng	ADT availability	%
	Excavator availability	%
	Dozer availability	%
	Support fleet availability	
Pr	Coal crushed	tons
	Crusher availability	%
	Coal inventory	tons
Trans	Coal loads to Eskom	tons
Quality	CV	MJ/kg
	%Ash	%
	% Vol	%
	% S	%
Manpower	# People	#
	# People(Contractors)	#
	Normal time	h
	Overtime hours	h
	AWOP	#
Controllable costs	Drilling & blasting	R
	Fuel	R
	ADT maintenance	R
	Excavator maintenance	R
	Support fleet maintenance	R
	Crusher maintenance	R
	Drilling	R
	Blasting	R
	Equipment Rentals	R

Matrix 7.1 Key performance indicators

Task 7.2 Operations Management System layout: Description of the operations management system (OMS) layout in terms of forecasting, planning and scheduling, executing and reporting.



Model 7.2 Operations management system layout

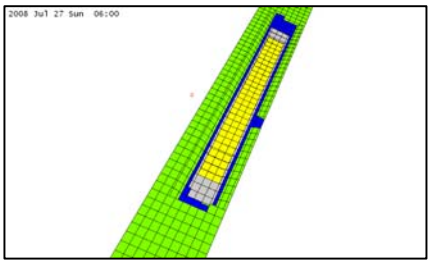
Task 7.3 Forecasting: Development of 10 year and annual mine plans for the mining operation.

M 7.3
Forecasting

	UoM	Total	Year 1	Year 2	Year 3
ROM	t	2,960,000	800,000	1,080,000	1,080,000
Sized product 73% yield	Sales t	1,776,000	480,000	648,000	648,000
Monthly ROM production	tpm	246,667	66,667	90,000	90,000
Monthly sales	Sales tpm	148,000	40,000	54,000	54,000

Matrix 7.3 Forecasting

Task 7.4 Planning and scheduling: Development of a monthly mine plan from which manpower and fleet are scheduled to meet the monthly mine plan.



Model 7.4 Forecasting

Task 7.5 Executing: Accurate reporting on key indicators at operational level to allow for action plans on a daily basis. Action plans are in place and discussed in daily review meetings.

SHIFT REPORT

Miner:	G.Erasmus
Shift:	Day
Team:	A
Date:	6-Jun-03
Area:	Sect 1

PRODUCTION CONTROL

KPI	UoM	Plan	Actual	Variance	Code
Drilling	m	200	150	-50	a
Blasting	m3	4,000	5,000	1000	
# loads	#	1,000	900	-100	c
OB softs hards	m3	4,000	3,000	-1000	e
OB Softs	m3	4,000	5,000	1000	
Total waste	m3	8,000	8,000	0	
Coal	**tons**	**4,166**	**3,500**	-666	b

Codes	
a. Operator	g. Geology
b. Standbye	h. Ramp buildin
c. Puncture	i. Breakdown
d. Abuse	j. Other
e. Weather	
f. Account	

EQUIPMENT CONTROL

Equipment	Type	Plan avail.	Availability.	Code
Excavator	Liebherr	85%	99%	
ADT 1	Bell	85%	85%	
ADT 2	Bell	85%	76%	k
ADT 3	Bell	85%	76%	k
ADT 4	Bell	85%	76%	k
Dozer	Bell	85%	70%	c
Grader	Bell	80%	66%	d
Watercart	Bell	80%	66%	h
Diesel bowzer	Bell	80%	66%	i

Codes	
a. Eng	j. Elect
b. Trans.	k. P/maint
c. D/box	l. Other
d. Diff	m. U/carr
e. D/line	n. Bkt
f. F/Drive	
g. Brakes	
h. Steer	
i. Hyd.	

MANPOWER CONTROL

Job category	H	Manpower #		Overtime	
		Plan	Actual	Hours	Code
Miner	#	1	1		
Excavator operator	#	2	2		
ADT operator	#	8	8		
Dozer operator	#	1	1		
Grader Operator	#	1	1		
Watercart	#	1	1		
Diesel bowzer operat	#	1	0		
LHD Driver	#	3	2	1	d
Total	Total	18	16	1	

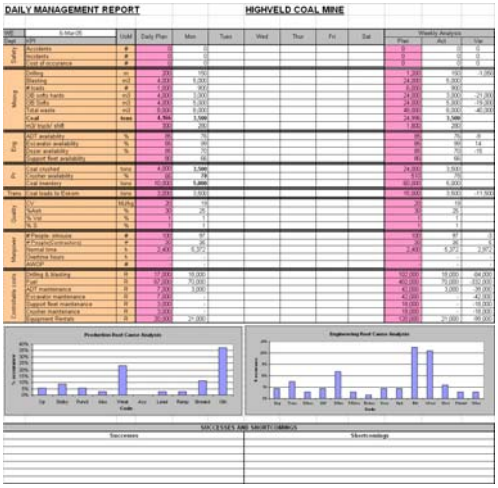
Codes	
1. Absenteism	
2. Vacation	
3. Housekeeping	
4. Lateness	
5. Training	
6. Meeting	
7. Sickness	

Action Plan

1
2
3
4
5
6
7
8

Matrix 7.5 Planning and scheduling

Task 7.6 Reporting: Analytical information of JMC to allow proper monitoring of the operational performance. Plan versus actual and root causes for deviation presented.



Matrix 7.6 Reporting

Database 4, operations management system, supports Step 7. In this database, a generic operations management system is provided, which can be easily adapted to any operating mine.

DB 4

Operations Management System

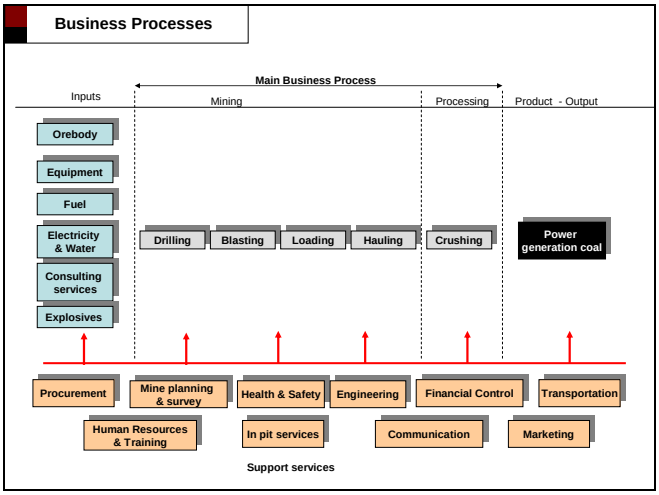
- Forecasting
- Planning & scheduling
- Executing
- Reporting

Database 4 Operations management system

Step 8 Operations Optimisation

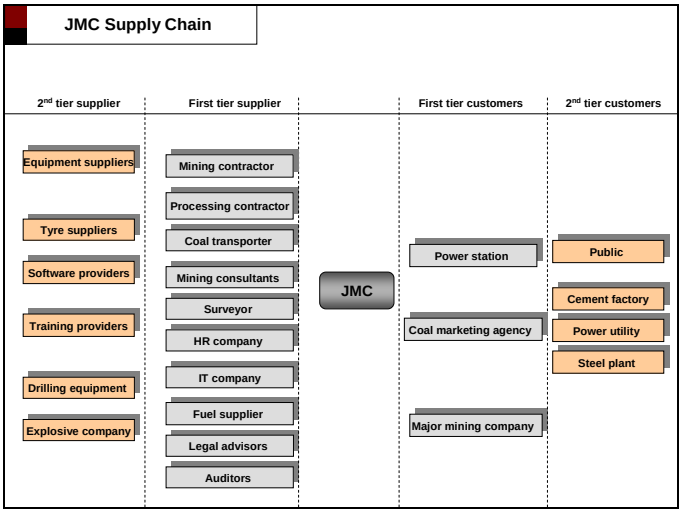
Operations optimisation is about gaining an understanding of the business processes of the mining asset, understanding the supply chain and using this insight to determine the cause and effect of suboptimal performance. Opportunities are identified and ranked and optimisation projects initiated using the project control sheet.

Task 8.1 Business processes: Mine business processes defined: inputs, main business processes, outputs, and support services. The performance objectives clearly defined.



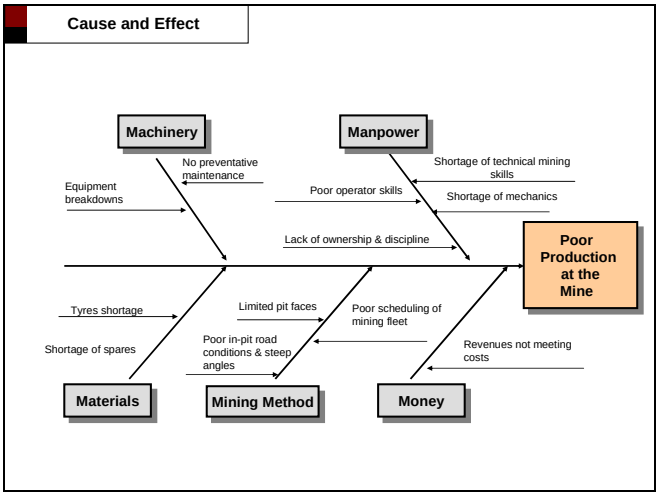
Model 8.1 Business processes

8.2 Supply chain: First- and second-tier customers and suppliers understood and used for relationships and optimisation.



Model 8.2 JMC supply chain

Task 8.3 Cause and effect: Key operational challenges defined and a cause and effect analysis undertaken on manpower, machinery, materials, mining method and money.



Model 8.3 Cause and effect

Task 8.4 Opportunity database: Determine opportunities based on business process, supply chain, cause and effect analysis. Opportunities are logged on the opportunity log, ranked, with action plans and responsibilities.

M 8.4

Opportunity Database 1=hard 1=low

Area / Process	Opportunity	Ease 1 to 5	Impact 1 to 5	Score Total	Quantified Impact	Next Action Required	Resp.	Due date
Area 1								

Matrix 8.4 Opportunity database

Task 8.5 Project control sheet: Development of project control sheet to re-engineer top opportunities. Sheet to outline purpose of project, goals, benefits, project dependants, project schedule, cost and action plan.

M 8.5

Project Control Sheet

Purpose of Project		Supporting Operational Goals										
Benefit		**Project dependants**										
Project Schedule	**Resp**	**Wk 1**	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 5**	**Wk 6**	**Wk 7**	**Wk 8**	**Wk 9**	**Wk 10**	**Wk 11**
Project Costs		**Action**								**Who**	**Due**	**Ref #**

Matrix 8.5 Project control sheet

The corresponding database for Step 8 is Database 5, mine optimisation opportunities. Here, generic mine optimisation opportunities are outlined, pertaining to the individual business processes on a mine. These opportunities are applicable to most mining operations.

DB 5

Mine Optimization Opportunities

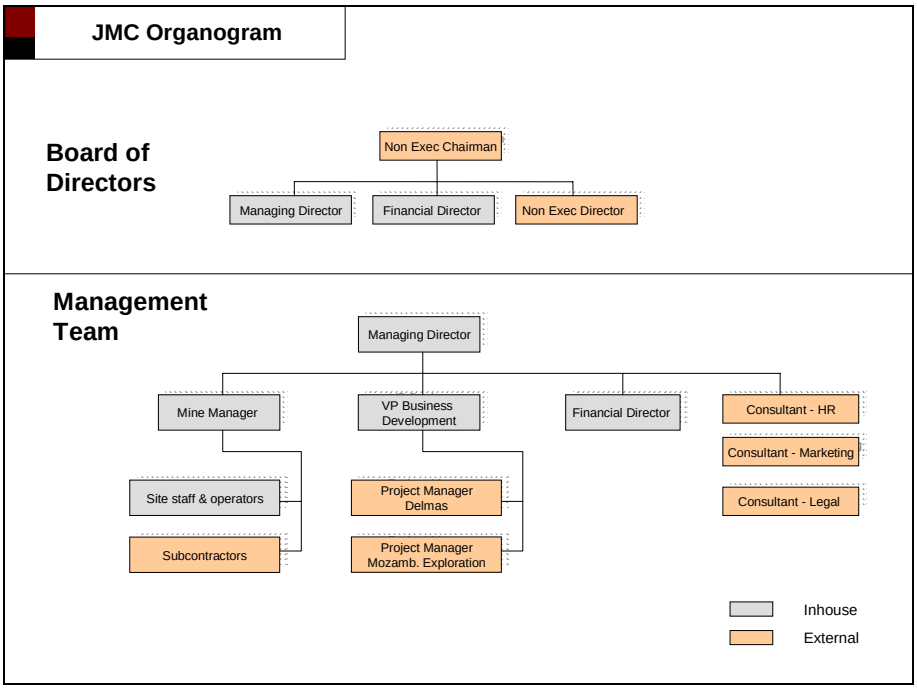
Mining Planning	**Loading & hauling**	**Processing**
Accountability of mine planners	Mechanical availability and reliability of loaders	Mineral inventory management
Practicality of mine plan	Poor road conditions	Recoveries
	Balancing of equipment with targets	Interface with engineering
Drilling	Lack of ownership and accountability by truck operators	Plant availabilities
Drilling room and face availability	Tracking of driver performance per machine	Operator skills and ownership
	Roadway spillage and effect on tires	Mineral theft
Blasting	Mismatch of trucks to available excavators	Waste management
Blast fragmentation to match crusher input requirements	Bottlenecks at dumping operation	**Financial**
Cost cutting initiatives impact negatively on blasting performance	**Engineering**	Consultation of operations people in budgeting process
Coordination of clean faces for blasting	Bureaucratic maintenance systems	In-time financial indicators at operational and management levels
Adherence to mine plan	Lack of real time information	Awareness of costs at operational levels
Time between blasting	Long repair times	Calculate the return on investment prior appointing contractors
	Scheduling constraints	
	Prioritization of repair work	**Procurement**
	Supplier performance	Cumbersome ordering methods
	"New parts" fitters	Payment terms & conditions
	Lack of focus on key ingredients: diesel, water, air, oil	Selection of suppliers
	Right tools for the job	Supplier relationships
	Analysis of breakdowns with suppliers	Skills of buyer
	Communication	
	Communication between mining, processing & engineeringneral inventory management	

Database 5 Mine optimisation opportunities

Step 9 Team Leadership

In Step 9, the organogram for the JMC is determined, job profiles for employees and consultants are created, an employee profit-share is determined, leadership communiqué is presented and a method for managing the diverse personalities in a JMC is introduced.

Task 9.1 Organogram: Organogram of JMC board of directors and team. Positions clearly displayed.



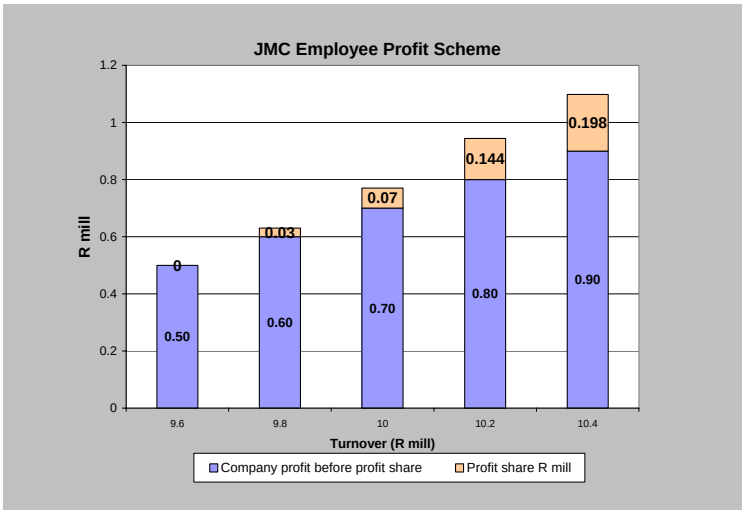
Model 9.1 Organogram

Task 9.2 Job profiles: Job profiles established for JMC team, consultants, staff and supervisors. To be included are critical performance area, critical performance indicator, deliverable summary and description.

Position				
Experience				
Pre requisites				
Objective:				
CPA (Critical Performance Areas)	**CPI (Critical Performance Indicators)**	**DELIVERABLES: Descripition**	**DELIVERABLES**	
Team leadership	Leadership	Bring out the best in people. Keep focus of EXR on corporate mission. Provide & ask for feedback and corrective support. Make calls regarding issues that distract the team from achieving the mission	1.1	Company leadership
	Performance management	Provide clear job profiles & deliverables for Board and Exco members, for approval by Board.	1.2	Performance management system in place for Exco
	Coordination of EXR divisions	Manage & coordinate EXR divisions to ensure alignment with corporate mission. Ensure core divisional targets, deliverables are set & implemented. Provide direction to Exco team. Regular feedback to Board.	1.3	EXR departments aligned to overall mission
	Communication, decision making	Ensure adequate forums for open communication and decision making are put in place:	1.4	Weekly Exco, weekly Partner meeting, quarterly Board meeting, appropriate Board resolutions.

Matrix 9.2 Job profiles

Task 9.3 Employee profit share: Employee profit share scheme in place which determines profit share scheme for management and employees for motivational purposes.



Model 9.3 Employee profit share

Task 9.4 Leadership: Regular communication from the CEO to communicate JMC events, results, actions and future prospects.

Team Leadership

ENERGY X RESOURCES

MESSAGE TO EXR EMPLOYEES, PARTNERS, CONSULTANTS AND CONTRACTORS FROM THE MANAGING DIRECTOR ON FIRST QUARTER'S OPERATIONAL PERFORMANCE

Safety
No incidents or accidents were reported for this quarter – well done. Let us remain focused on safety at all times, it is most important for our families and EXR.

Highveld Coal Mine Operations
March has proven to be the best month in to date for the Highveld Mine. We have improved significantly since January, and I want to thank all of you for your efforts. EXR must recover from the poor performances in December, January and February, and March is our first good month. More visible leadership, extensive management involvement with foreman and the resultant team involvement, improved communication, the use of tippers and a rented-in grader were amongst the main reasons that have contributed to improved performance. Challenges, which we need to be addressed are engineering availabilities, dozers, communication, machine cleaning and greasing, operator availabilities, support services and procurement streamlining. We are going to spend our efforts to improve and assist the engineering team with increasing availabilities.

Ermelo Coal Mine Feasibility Study t
We have now completed the final mine plan for the feasibility study which is required for the financing campaign to raise the necessary project finance. EXR's project structure have been set up and we are preparing all the necessary technical documentation for the capital raising campaign.

Mozambique Exploration Project
We have commenced with the drilling campaign at our coal exploration properties in Mozambique. The exploration camp has been established and we look forward to the input from industry expert xxx. The property hosts the potential for natural gas, and we will investigate the viability of this opportunity together with joint venture partners.

Leadership
We have changed the leadership structure at Highveld Mine in line with our need to focus on productivity. XYZ is the appointed General Manager for the Highveld Mine and requires your full support in moving the mine forward to profitability.
Thank you for working hard this month. Let us position ourselves for a growing future.
Kind regards,

_____
Managing Director
Energy X Resources

Model 9.4 Team leadership

Task 9.5 Personality management: Have the BOD analyzed the personalities of the team members to play on their strengths and overcome their weaknesses?

M9.5	
Personality Management	
Position	Position
Person	
Character	
Description	
Strengths	
Weaknesses	
Needs	
Management	

Matrix 9.5 Personality management

Databases 6 and 7 are used as input for Step 9. Database 6 contains an analysis of JMC teams in terms of composition of the Board of Directors, disciplines, experience and professions.

DB 6
JMC Teams
▫ Board of directors
▫ Management teams
▫ Experience
▫ Professions

Database 6 JMC Teams

In Database 7, a methodology by Steve Scott is presented which is used to determine the dominant and subdominant characteristics of the JMC team members, in terms of strengths, weakness and needs. By using the database, a better understanding of the team players is obtained which will lead to improved relationships and better performance within a team.

DB 7			
Team Management			
People characteristics: 1 dominant, 1 subdominant			
Lion	**Otter**	**Golden Retriever**	**Beaver**
Leader, boss, bottom line orientated observer, not listener loves to solve problems like to seek new adventures very low threshold for boredom focus on now instead on distant future	Party waiting to happen excitable, fun loving, cheerleader type, people orientated Concerned about popularity rather than results Desire prestige, flashy, attentative to style Want to verbally share ideas Lots of wrong calls because go with feelings, not facts Have to have approval	Loyal, spends time helping others & building relationships, can absorb most emotional pain & punishment from relationships & remains committed to relationship, great listener, empathetic Focus on present Fears change, likes status quo	Perfectionist – where exact science Accountants, attorneys, engineers, architects, mathematicians Strong need to do things right, by the book Great for quality control NB: rules, consistency, standards, frustrated with others who don't share same characteristics
Needs			
Results, variety, new challenges, freedom, authority, opportunity for advancement	Social activities, activities that are fun, free from detail work, approval	Security, gradual change & time to adjust, environment free of conflict, quality relationships, security, own area/space, relaxed friendly environment	Clearly defined tasks, stability, security, gradual change low risk, tasks requiring precision & planning

Database 6 Team management

iv) Risk Management Pillar

In this pillar, the focus is on identifying risks (Step 10), quantifying risks (Step 11) and managing risks (Step 12).

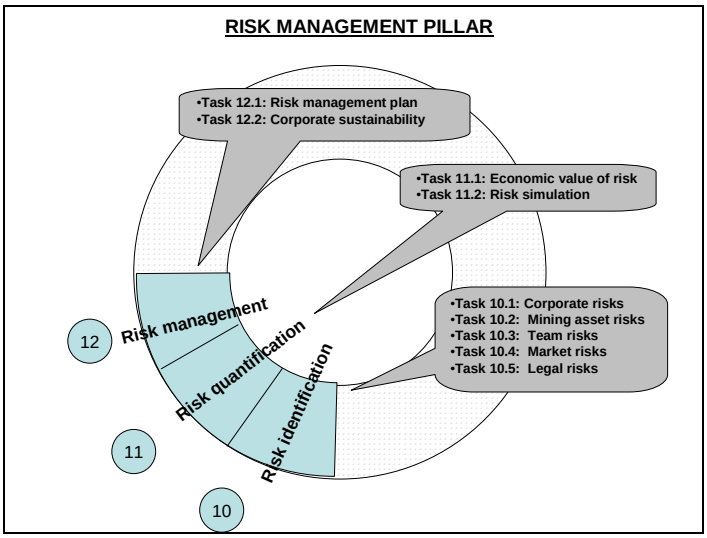


Figure 6.5 Risk management pillar

Step 10 Risk Identification

In Step 10, corporate, mining asset, team, market, legal and financing risks are identified using Model 10.1, as well as Database 8.

Task 10.1 Corporate risks: Corporate risks identified relating to: strategic direction, acquisitions, JV partners & shareholders, corporate governance.

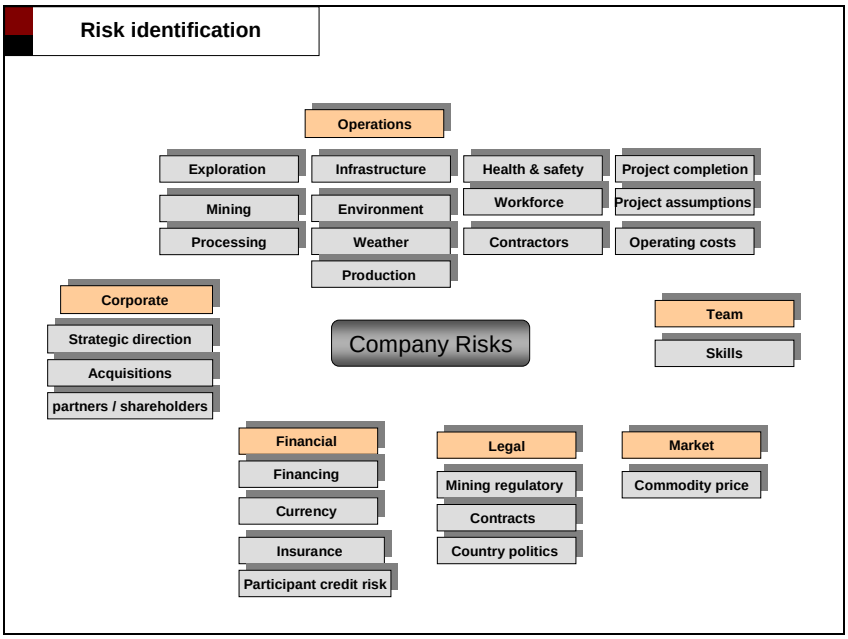
Task 10.2 Mining asset risks: Mining asset risks identified pertaining to geology and exploration, mining, processing, infrastructure, the environment, weather, production performance, health and safety, industrial action, contractors, project completion, project assumptions and operating costs.

Task 10.3 Team risks: Risks relating to skills and company leadership.

Task 10.4 Market risks: Market risk relating to a falling commodity price, which is a function of demand and supply.

Task 10.5 Legal risks: These risks relating to mining legislation, contracts and host country politics for the JMC.

Task 10.6 Financing risks: Risks relating financing, currency, insurance and participants.



Model 10.1 Risk identification

In Database 8, technical, economic and human risks are listed, which have been determined for greenfields mining projects. These risks are generic, and may be applicable to other mining projects.

DB 8	
Risk Identification	
Technical risks: ▯ The geology does not materialise according to the studies ▯ Geological data and record losses / unavailability ▯ Wrong selection of mining method ▯ Environmental risk ▯ Poor yields ▯ Equipment availabilities ▯ Infrastructure failure **Economic risks:** ▯ Cost and availability of electricity and water ▯ Mining company forced to use government services even if not competitive. ▯ New entrants into market ▯ Unsaleability of product ▯ Incorrect market-forecast ▯ Insufficient capital / underestimation of costs ▯ Decreasing commodity prices ▯ Change in tax regime ▯ Cannot obtain finance ▯ Decreasing control in project management ▯ Delay in production start-up	**Human risks** ▯ Host government does not honour agreement ▯ Political instability ▯ Threat to health and safety of employees ▯ Delay in obtaining leases, permits and mining rights ▯ Land claims ▯ Unstable, unionised labour force ▯ Low availability of skilled, competent labourers ▯ Mining company cannot adapt to cultural diversity ▯ Non-performance of contractors ▯ Lack of project performance from the state ▯ Lack of consensus between joint venture partners ▯ Importation restrictions

Database 8 Risk identification

Step 11 Risk Quantification

In Step 11, the economic value of the risk is determined and the risks are simulated on the JMC's economic model.

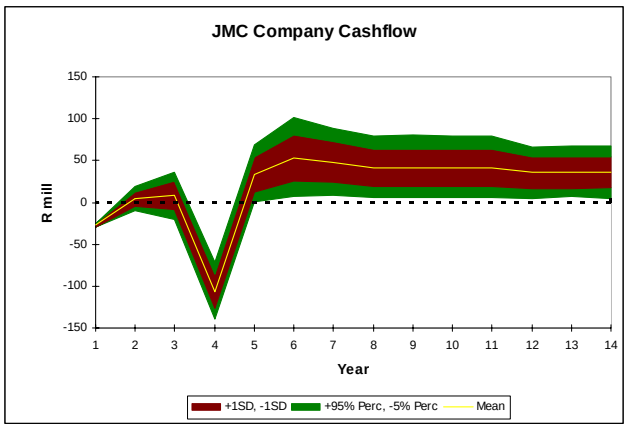
Task 11.1 Economic value of risk: Have the probability and impact of the corporate, operational, team, market, legal and financial risks been determined? Has a risk ranking been undertaken of high, medium and low risks?

M11.1
Risk Qantification: Expected Values

Risk	Low = <20% Medium: 20% - 50% High:>50%	Impact (R mill)	Expected value (R mill)
Wrong strategic direction	0.2	7	1.4
Acquistions	0.3	10	3
JV partners / sharholders	0.4	11	4.4

Matrix 11.1 Economic value of risk

Task 11.2 Risk simulation: Have the risks effects been simulated on the economic model of the company? The risk software '@Risk' is used to simulate the risks on the JMC's economic model in a Monte Carlo simulation.



Model 11.2 Risk simulation

Step 12 Risk Management

In the last business pillar step, a risk management plan is defined and issues of corporate sustainability tackled.

Task 12.1 Risk management plan: Has a risk management plan been defined for the JMC's high and medium risks?

M12.1

Risk Management Plan

Risk	Expected Value	Control	Management
Production – poor machine availabilities	R7.8 m	Control	Focus on preventative maintenance and regular services

Matrix 12.1 Risk management plan

Task 12.2 Corporate sustainability: Is corporate sustainability ensured through corporate governance practices, community development initiatives and environmental management?

M12.2

Corporate Sustainability

Area	Activity / area	JMC
Corporate governance	Board responsibilities	
	Directors independence	
	Audit committee	
	Remuneration committee	
	Safety,occupational health committee	
	Risk assessment & management	
	Shareholder communication	
	Ethical standards	
	Securities trading	
Community development	Mining asset 1	
	Mining asset 2	
	Mining asset 3	
Environmental management	Mining asset 1	
	Mining asset 2	
	Mining asset 3	

Matrix 12.2 Corporate sustainability

Database 7 supports Step 12, by outlining corporate governance practices, community development projects and environmental management projects of JMCs. This serves as a benchmark for the player of the game.

DB 7
Corporate Sustainability
Corporate governance practices - JMC's
Community development projects JMC's
Environmental management - JMC's

Database 7 Corporate sustainability

6.2.5 Scoring the Game

The final step of playing the game is determining the company score in order to benchmark the JMC as an investment opportunity and provide the executive team with an assessment of the winning potential of the JMC. The following is scored and assessed:

- ✓ The mining assets: The assets contribute 25% of the game score.
- ✓ The business pillars: the strategy, legal and financial, operations and risks management pillars of the JMC. The business pillars contribute 50% of the score.
- ✓ The financial performance of the JMC. The financial performance contributes 25% of the game score.

The score ranges between 5 (excellent) and 1 (not achieved). The game score matrix allows the JMC to be allocated a score which allows the company to be ranked against its peers as an investment opportunity. Areas of strengths and weaknesses are identified and highlighted graphically.

Score matrices have been developed and applied to the hypothetical JMC EXR. They are attached in Appendix D. The summary game score for EXR is displayed in Figure 6.6.

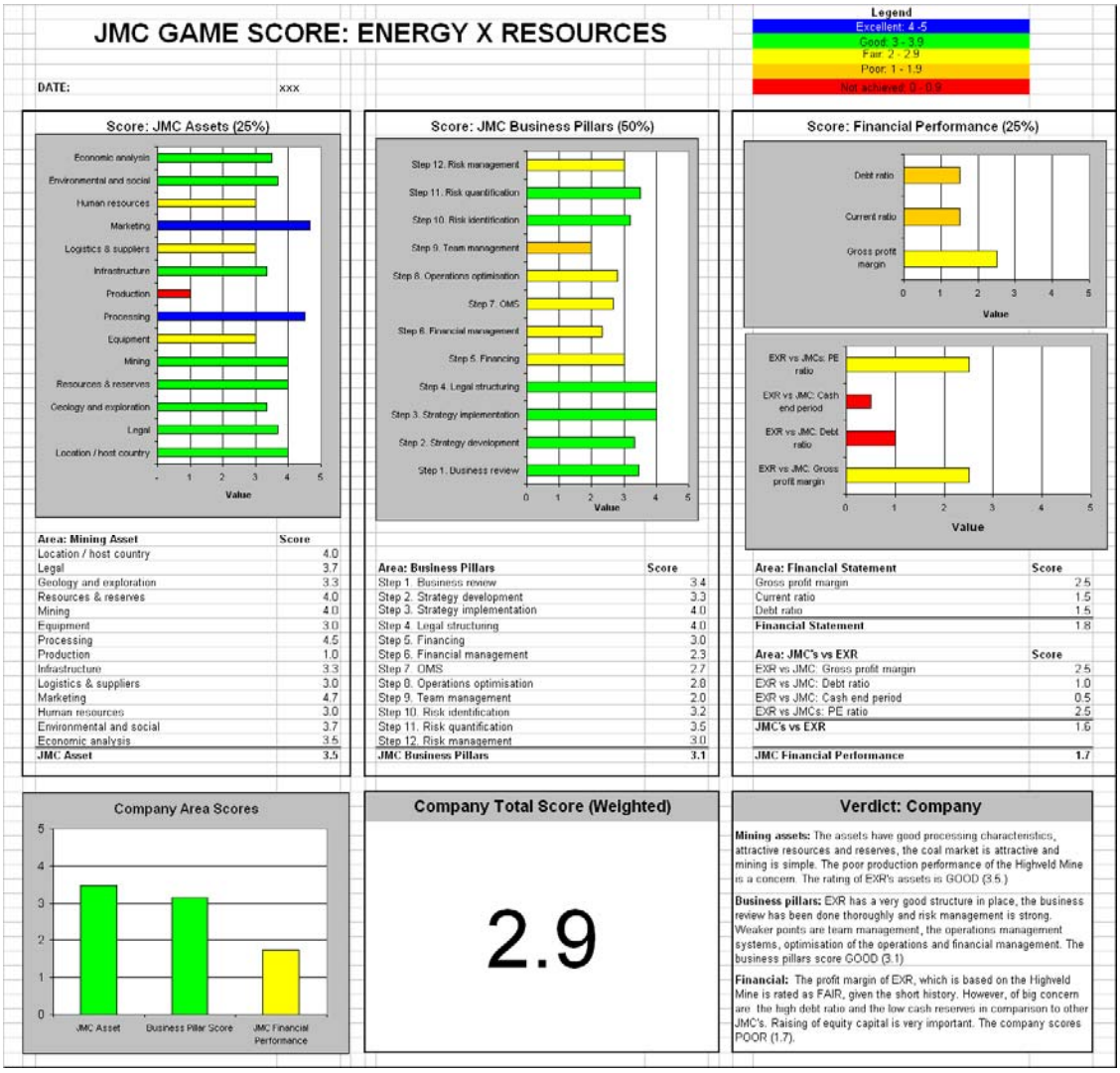


Figure 6.6 Company game score

6.3 Significance of the Research and Conclusion

The author has sought to develop a model for junior mining companies that spells out all the key steps and tasks that are integral to a successful game plan for junior mining companies.

The game plan model for junior mining companies which has evolved out of this thesis is intended to become the tool that any mining investors, mining entrepreneur, junior mining company intent on entering or improving his game in junior mining can use to play the game, which includes strategy development, legal and financial, operations management and risks management steps surrounding his hypothetical or actual mining assets, based on the foundational elements that are applicable to the resources sector. A game score can be determined which will highlight areas of strengths to be expanded upon and areas of weakness to be addressed.

The game plan is both strategic and tactical, it focuses on conceptual aspects of the game of junior mining, as well as the actual executing part. The game plan draws together strategic and tactical elements, hard and soft issues, and analytical and psychological aspects.

The author has attempted to incorporate all the vital aspects of a successful game plan, without trying to go into too much detail. Much of the game plan is based on the practical experiences of the author, who launched a junior mining company throughout the period of research. These elements were proven and tested in real life situations. A key to the success of a game plan is simplicity and the author has attempted to provide easy, simple models and matrices for each step and task. Each foundation, step and task in the game plan represents its own individual research topic and can be addressed in more detail, but this was not the purpose of the present research. The intention was to create a holistic picture that encompasses all key elements of success.

Another important element of the game plan was that is should be constructed in such a manner that it can be applied to the constantly changing resources industry dynamics. The model must hold both in a boom and in a bust period.

The game plan can be applied to any junior mining company in any commodity. Prior to launching an actual junior mining company, the aspiring team can use the game plan model to create a trial around its prospective mining venture, in a similar fashion to the case study of EXR and come up with a company score. In doing so, the possible challenges can be determined prior to the actual event, strengths can be determined and expanded upon and weaknesses addressed before they materialize. Another benefit is that of playing the game in an iterative mode. As the steps are repeated, they are improved upon every time, ultimately leading to the tasks being completed in a much more efficient, globally competitive manner.

South Africa's future in mining is dependant on the successful establishment of a junior mining sector. Many major mining companies are exiting as a result of the depletion of large, deep ore reserves, and the future is dependant on junior and mid-tier mining companies that can profitably develop and mine the smaller reserves. The Canadian and Australian junior miners are masters in their class, and South African junior miners need to play a more prominent role in this sector. The game plan model is intended to be the well-researched, practical tool for these aspiring players in the South African junior mining sector.

Similar to the game Cashflow 101, chess or soccer, the motto for the junior mining company game plan model should be: *the more you play the game the better you become.*

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APPENDICES

The Appendices of the thesis are provided in an electronic format in the attached CD and in the poster roll.

Appendix A: Australian Junior Mining Companies (electronic)

1. Anvil Company Analysis.doc
2. Equinox Company Analysis.doc
3. Gallery Gold Company Analysis.doc
4. Resolute Company Analysis.doc
5. Aquarius Company Analysis.doc

Appendix B: Canadian Junior Mining Companies (electronic)

1. Tiomin Company Analysis.doc
2. Adastra Company Analysis.doc
3. Banro Company Analysis.doc
4. Etruscan Company Analysis.doc
5. First Quantum Company Analysis.doc

Appendix C: UK Junior Mining Companies (electronic)

1. Petra Diamonds Company Analysis.doc
2. Jubilee Company Analysis.doc
3. African Eagle Company Analysis.doc
4. Kenmare Company Analysis.doc
5. Randgold Resources Company Analysis.doc

Appendix D: South African Junior Mining Companies (electronic)

1. Thabex Company Analysis.doc
2. Metorex Company Analysis.doc
3. SXR Uraniun OneAflease.doc
4. DRDGold Company Analysis.doc
5. Barplats Company Analysis.doc

Appendix E: EXR Economic Model and Simulation Results (electronic)

- EXR Economic Model.xls (to be used in conjunction with software @Risk)

Appendix F: Junior Mining Gameplan Model

- Junior Mining Gameplan Model - poster roll
- Junior Mining Gameplan Model.ppt
- Junior Mining Gameplan Score Matrix.xls

CD: Appendices A, B, C, D, E