Value based management and productivity: The mining situation

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Abstract

The cost of mining companies listed on the Johannesburg Stock Exchange (JSE) have not been immune to inflationary pressures. Increasing cost pressures, lower grades, and reduced electricity supply imply that management will have to apply rigorous cost saving measures to mitigate the effect on profits.

One such measure is value based management (VBM). VBM is a powerful management framework with the aim to focus all managerial processes on shareholder wealth creation. It therefore encourages all staff levels within the organisation to focus on value creation. Various metrics have been developed to measure the value creation process within the organisation. Discounted cash flow to the present value at the weighted average cost of capital lies at the heart of these metrics. Through the use of value mapping, underlying value drivers are linked to the overall strategy of value creation. While value-based management is used to increase shareholder value, one of the serious drawbacks is the short-term focus on immediate results to the detriment of long-term sustainable competitive advantage.

A quantitative study was done on the mining sector to determine if investors can use productivity as a value based management measurement to predict share price movement. The results from this study indicate that productivity measures do not influence share price. Productivity is good for determining shareholder value, but not adequate for determining stock performance.

Even though it was found that investors do not rely on productivity measures, companies should still focus on creating value for the shareholders. It is beneficial to investors to understand what value based management is, and to understand management actions in terms of value creation.

List of key terms: value based management (VBM); net operating profit after tax (NOPAT); economic value added (EVA); cash flow; shareholder value added (SVA); discounted cash flow (DCF); productivity.

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Abbreviation	Term
ABC	Activity-based costing
ABM	Activity-based management
AICPA	American Institute of Certified Public Accountants
ALSI	All Share Index (JSE)
ASP	Average Share Price
ΔASP	Change in Average Share Price
BSC	Balance Score Card
BPM	Business process management
CFROI	Cash flow return on investment
CVA	Cash value added
DCF	Discounted cash flow
DERO	Discounted equity risk option
EBDIT	Earnings before depreciation, interest and tax
EBIT	Earnings before interest and tax
EE	Equity equivalents
EP	Economic profit
EPS	Earnings per share
EVA	Economic value added
FCF	Free cash flow
JSE	Johannesburg Securities Exchange
KPA	Key performance areas
KPI	Key performance indicators
MVA	Market value added
NOPAT	Net operating profit after tax
NPV	Net present value
PE	Price earnings
ROCE	Return on capital employed
ROE	Return on equity
ROI	Return on investment

ROIC	Return on invested capital
SVA	Shareholder value added
URL	Uniform Resource Locater
YSP	Year-end share price
ΔYSP	Change in year-end share price
VBM	Value based management
WACC	Weighted average cost of capital

CHAPTER 1:
NATURE AND SCOPE OF THE STUDY

1.1 INTRODUCTION

According to the Quarterly Bulletin of the South African Reserve Bank (2008:1), the South African economy weakened considerably in the third quarter of 2008, recording the lowest quarterly growth rate in ten years. A substantial contraction in real value added was registered by the mining sector, which was directly affected by weaker international demand, falling commodity prices and interruptions due to maintenance, safety procedures and strikes. In a similar vein, the real output originating in the manufacturing sector declined significantly in the third quarter.

The doom was further exacerbated by Van Tonder (2009:8) who argued that the South African economy was in a recession due to two consecutive quarters of negative growth in 2008. Shiskin (1974:222) suggested several rules of thumb for identifying a recession, one of which was "two down quarters of GDP". During the third quarter of 2009, real GDP increased by 0.9% (measured quarter-on-quarter at a seasonally adjusted and annualised rate). This followed three consecutive quarterly contractions of the GDP (Q4 2008: -0.7%; Q1 2009: -7.4%; Q2 2009: -2.8%). In the technical sense of the word, therefore, the South African economy is no longer in a recession. However, this kind of statement should be made and interpreted with a great deal of circumspection (Pradova, 2009:1). In many ways the GDP is a rather narrow gauge of the performance of an economy, merely measuring output in various sectors. It does not necessarily take into account changes in real household income, wholesale and retail sales, and employment, nor does the GDP reflect the way in which economic output is distributed.

No matter what economic cycle is prevalent it is important that investors understand the business strategy of the company, because the financial statements are the result of the strategy followed by the company (Libby *et al.*, 2004:705). There are numerous ratios that can be used to test the profitability, liquidity, asset management, and solvency, as well as to test how the company is performing relative to peers and the

market. The financial performance of a company can also be used to determine the net present value of a company as well as to assist management with identifying and pursuing additional value creation opportunities.

The only true measure of management actions to create wealth is when capital is invested at returns higher than the cost of that capital (Koller, 1994:87). This is known as value based management (VBM). Koller (1994:89) describes value based management as a marriage between a value creation mindset and the management processes and systems that are necessary to translate that mindset into action.

Managers are required to use value based performance metrics for better decisions at all levels in an organisation. It entails managing the balance sheet as well as the income statement, and balancing long and short-term perspectives (Koller, 1994:87).

As mentioned earlier in the chapter, the financial statements of a company represent the result of the company's business strategy. Strategies fail mainly because of a lack of focus and competency gaps (Wery & Waco, 2004:153). When a company develops a business strategy which is based on flawed measures, it can result in uneconomic decisions and ultimately lead to value destruction. The board of directors or the management of a division, it is argued, would be able to make much better informed decisions with regard to the creation or destruction of wealth if these decisions are based on VBM principles. VBM metrics need to become a way of life and not just a mere paper exercise. Whatever metrics are used to determine the value of a company should not be calculated at a specific time, but the goal should be to increase the value from period to period.

Wealth creation has become a buzz concept within the mining sector on the Johannesburg Securities Exchange (JSE). Basic commodity industries have learned to live in a world of significant price cycles. When commodity prices rise these companies normally do all it can to maximise output. When prices drop these companies need to be well positioned on the cost curve. It is the ability to get as much as possible material out of the ground (and to market and sell) at the lowest possible cost that distinguishes the leading operators.

At the peaks of the price cycle, tight control over operating cost is vital in creating share attractiveness to current and potential investors. The cyclical nature of the mining sector suggests that a downturn is inevitable, and this is why shrewd investors want more than a proven resource base; it is equally important for companies to know how to exploit this resource as efficiently as possible over a period of time.

Mining companies are highly capital-intensive and mining companies endeavour to apply manpower and production assets in the most efficient way. One of the advantages these companies enjoy is the ability to flex production without the cost and to delay the acquiring of new equipment until the demand for commodity rises again. A lean culture takes sustained effort to create. It needs an open, trusting relationship between the frontline and management, and commitment from all parties to avoid blame and to pursue continual improvement (Collins, 2001:45).

1.2 PROBLEM STATEMENT

Mining companies in South Africa have attracted a lot of investment interest from investors both in South Africa and abroad. With this in mind as well as the cyclical nature of commodities, mining companies operating in South Africa should make themselves even more attractive by means of enhancing wealth creation for current and potential investors. Mining companies must be able to demonstrate competiveness and attractiveness with companies across a range of sectors both locally and abroad.

Many investors look only at corporate earnings, price: earnings (PE) ratio, profitability or the anticipated profitability for a number of reasons. These reasons might include the lack of knowledge of that particular industry or company and investments across various industries. However net operating profit after tax (NOPAT) is a better measure since it reflects sales less cost of sales less overhead expenses, where cost of sales is influenced by certain efficiencies like ounces per employee (in case of a mining company).

While the South African economy has been performing well in recent years and the listed companies have benefited through rising share prices, the question must be

asked how much wealth has these companies been able to create for shareholders. Was the record earnings a result of internal excellence, or was it a result of a conducive external economic environment? If these companies have been able to post positive results, was it possible to create wealth for shareholders while doing so? Can investors make use of value based management metrics as indicators of share price movement?

1.3 GOALS AND OBJECTIVES OF THE STUDY

The goals of this study can be summarised into a main goal and sub-objectives.

1.3.1 Main goal

The main goal of this study was to investigate and determine whether operational performance and productivity measures in the mining sector can be used by investors as an indicator for share price movement of mining companies, listed on the JSE.

1.3.2 Sub objectives

- To investigate and determine to what extent operational performance and productivity is responsible for share price movement; and
- To investigate and determine how mining companies listed on the JSE performed against the All Share Index of the JSE.

1.4 RESEARCH METHODOLOGY

The research methods that were used within this research are the following:

1.4.1 Literature study

A literature study was done to provide a conceptualisation of VBM. The literature study focused on the following: VBM principles, operations strategy and competiveness, the link between economic profit and share price, how to improve economic profit, benefits/advantages of using VBM, critique of VBM, productivity and VBM strategy.

1.4.2 Empirical study

The empirical study was done by means of a quantitative study. The quantitative research was done by making use of historical financial data obtained from a database in order to determine if a company's production does have an effect on share price. The final part of the empirical study looked at how the performance of the mining companies' compared against the JSE All Share Index.

1.5 SCOPE OF THE STUDY

The field of study for this study is financial management. The research focused on how potential and current investors can use VBM measurements to determine corporate performance as well as share price movement. Mining companies listed on the JSE was considered for this study. However, all holding companies, diversified companies, and exploration and development companies were excluded from the research, as it was not possible to clearly distinguish and quantify the productivity measures employed by the entities.

1.6 LIMITATIONS OF THE STUDY

There are certain limitations to this research study. The findings of the research are limited to a specific subsector i.e. mining and not the whole industry. Thus issues identified might only apply to that subsector. It might, therefore, not be possible to identify what the common factors are that influence share prices in a particular industry.

1.7 LAYOUT OF THE STUDY

Chapter 1: Introduction

Chapter 1 sets the context of why the specific research topic was chosen. In this chapter, the problem statement is formulated and the research goals, research methods and limitations are given.

Chapter 2: Literature study

Chapter 2 contains the literature study to establish the theoretical basis for this study. The first section of the chapter focuses on the origins of VBM, principles, benefits and critique, as well as shareholder value, and value drivers. The second section focuses on productivity, linking it to VBM.

Chapter 3: Empirical study

Chapter 3 empirically investigates and applies the theory described in Chapter 2. The results from the investigation are analysed to determine if there is a correlation between a company's production and productivity and share prices.

Chapter 4: Conclusions and recommendations

Chapter 4 assesses the results of Chapter 3, in order to determine if investors can use VBM measurements to gauge share price movement. Recommendations, suggestions and conclusions will be made based on these findings.

CHAPTER 2:
VALUE BASED MANAGEMENT: THE THEORY

2.1 VALUE BASED MANAGEMENT

Value based management (VBM) is a powerful management framework with the aim to focus all managerial processes on shareholder wealth creation. It therefore encourages all staff levels within the organisation to focus on value creation.

2.1.1 Introduction

In today's business world, the primary aim of most firms is to maximise shareholders' wealth (Brigham & Ehrhardt, 2005:507). A company needs to ensure it creates consistent wealth for investors, reward employees for superior performance and also impact the community it operates in positively. How does the management of an organisation determine if it is meeting the expectations of shareholders and other stakeholders? Various questions emanate from the statement made by Brigham and Ehrhardt above. Amongst the questions are: Does a profit translate into shareholder wealth? What is the impact of external or internal forces on profit?

An organisation will have to adopt certain management methodologies, which will serve as an enabler in the quest to respond to the questions above. The adopted methodology should encourage innovation and create new opportunities to enhance shareholder value. One such methodology is managing for value or popularly known as value based management (VBM). According to Starovic *et al.* (2004:2), VBM is not meant to be descriptive and like other management concepts, managing for value has been adapted by companies to suit its circumstances. There can be no "one size fits all" model.

2.2.2 Development of value based management

Jordaan (2005:1) states that investors require a return on capital. Brigham and Ehrhardt (2005:150) concur that "investors must be compensated for bearing risk." This expectation by shareholders creates accountability from managers to evaluate the effects of alternative strategies on the organisation's value. In this regard, Brigham and Ehrhardt (2005:507) explain that forecasting financial statements under alternative strategies, determining the present value of each strategy's cash flow stream and then choosing the strategy is a process that provide the maximum value for shareholders. One such calculation is the value of operations which calculates the present value of all the future free cash flows expected from operations. In this case, the discounted rate is the weighted average cost of capital (WACC) where free cash flow (FCF) is the cash flow available for distribution to shareholders after the company has made all the investments necessary to stay in business. WACC is the weighted average cost of each capital component (debt, shares and preference shares).

There has been an overabundance of new management approaches for improving organisational performance. Koller (1994:87) lists some of these approaches:

- Total quality management;
- Flat organisations;
- Empowerment;
- Continuous improvement;
- Reengineering;
- Kaizen; and
- Team building.

Many of these approaches have succeeded, but just as many have failed, because performance targets were unclear and not properly aligned with the ultimate goal of creating value. Koller (1994:87) promotes VBM as the solution to the problem of unclear targets, simply because it provides an unambiguous metric value upon which an entire organisation can be built. However, Haspeslagh *et al.* (2001:64) state that the first requirement for VBM is a single-minded focus on shareholder value. Predictably, there might often be other conflicting corporate goals. The most common contending objective seems to be the desire to become bigger (Haspeslagh *et al.*, 2001:65).

Managers are often conditioned to think big, to strive to go global, for instance, or to be the number one company in the market, regardless of the consequences for value. The study by Haspeslagh *et al* (2001:65). uses Cadbury Schweppes as a case in point. Through the 1980s and early 1990s, the expressed ambition was to catch up to Coca-Cola and Pepsi while driving toward "a million tons of sugar consumption" in the confectionery business. Throughout the period, even though Cadbury was one of the most admired companies in Britain, the share price obstinately lagged behind the competitors.

The first challenge in implementing VBM, therefore, is usually to move the company out of the current mindset. To do that, the CEOs of the most successful VBM practitioners have nearly always kicked-off the programmes by making public an explicit commitment to shareholder value. First, executives communicate to the outside world that the company recognises the need to break with a prevailing culture. Second, some CEOs use the announcement as a way to energise internal constituencies.

The difference between success and failure with VBM depends on how well a firm integrates VBM into the culture of the organisation. The study, mentioned above, by Haspeslagh *et al.* (2001:66) found that the difference between successful and unsuccessful companies is that the former set of companies realise that VBM is not simply about the numbers; it is about building a culture around value creation. In other words, VBM has to become a way of life in any organisation. Anything less will lead to the creation of another tombstone in the organisation's collection of failed initiatives.

VBM has evolved significantly over the last 20 years. What started off as a breakthrough performance metric later matured into an entire management framework that focuses organisations around value creation. Companies such as Coca-Cola, DuPont and Cadbury are often hailed for the great results achieved since implementing a VBM framework into the organisation. Locally, Anglo American, PPC and Barlow World are some of the listed companies that have adopted VBM as its management mantra. Studies by Chopp and Paglia (2002:1) have shown that "VBM companies outperform their peers by 8.25% per year". Chopp and Paglia (2002:1) neglected to indicate what measurements were used in their calculations. Not surprisingly, many companies already have or are adopting a "Managing for Value" mindset hoping to

achieve similar results. In fact, one is hard pressed to read through a company's annual report and not find a reference to how the firm is managing for value.

Chopp and Paglia (2002:1) also warn that there is a complication with VBM. Doing it right is not easy. Recent reports have indicated that almost half of the companies that have adopted a VBM metric have had mediocre success. Where does that leave the investor? Prior to investing in an organisation it will be prudent to first analyse and investigate the prospective organisation. There are various ways of doing this, but Libby *et al.* (2004:704) suggest that the following three factors should be considered:

- **Economic factors**. These factors include the overall health of the economy, unemployment rates, inflation rates and interest rates.

- **Industry factors**. Is the particular industry in which the company operates in a growth or decline phase? What are the current trends in the industry? Where does the company fit within the industry?
- **Individual company factors**. When analysing the individual company, the analysis should not only be limited to the financial statements, but also to the products, as well as the media coverage and reputation.

It is important that investors have an idea and understanding of the business strategy of the organisation because the financial statements are the result of the strategy followed by the company (Libby *et al.*, 2004:705). There are numerous ratios that can be used to test the profitability, liquidity, asset management, and solvency, as well as to test how the company is performing relative to peers and in the market as a whole. The analysis of the financial statements is a judgmental process as not all ratios calculated are helpful in a given situation (Libby *et al.*, 2004:709). To give relevance to these ratios, it must be compared to other companies within the same industry, as this comparison gives a good indication of how the company is performing in relation to peers. From these results it might become apparent that the company is not on par with peers, and management might decide to improve the company's ratios to equal or outperform the ratios of the leading companies within the industry of operation. Such a decision might be disastrous, as not all companies are identical especially in regard to the capital structure. These ratios, which are very important for any company, are fragmented in

the sense that it does not give a single measure of how management is going about creating wealth for shareholders.

Corporate performance can be improved by boosting earnings per share (EPS), maximizing price to earnings (PE) ratios, maximizing the market-to-book ratio, and increasing the return on assets, but Koller (1994:90) believes that value is the only correct criterion of performance. VBM has become a popular topic in financial management and is measured in various forms, and numerous consulting firms have developed and popularised metrics designed to help corporations implement VBM systems. Some examples of metrics developed, according to Ryan and Trahan (1999:47) are:

Discounted Cash Flow (DCF):

Discounted cash flow (DCF) is important because it explicitly recognises the time value of money (Brigham & Ehrhardt, 2005:962). It can be hard to understand how stock analysts come up with "fair value" for companies, or why target price estimates vary so wildly. The answer often lies in how the valuation method known as DCF is applied.

However, one does not have to rely on the word of analysts. With some preparation and the right tools, one can value a company's stock oneself using the DCF analysis as a supporting technique to:

(a) Compare costs and benefits in different time periods; and
(b) Calculate net present value (NPV).

NPV utilises DCF to frame decisions and to focus on those that create the most value. DCF recognises that the market value of a company can be expressed as the present value of expected future cash flows discounted at the company's cost of capital. DCF analysis is widely used to appraise investment decisions. According to The Professional Accountant (Anon., 2009c:7), investment (project) appraisal refers to evaluations of decisions made by organisations on allocating resources to investments of a significant size. Typical capital spending and investment decisions include:

- Make or buy decisions, and outsourcing certain organisational functions;

- Acquisition and disposal of subsidiary organisations;
- Entry into new markets;
- The purchase (or sale) of plant and equipment;
- Developing new products or services (or discontinuing it);
- Decisions on related research and development programmes;
- The acquisition (or disposal) of new premises or property by purchase, lease, or rental;
- Marketing programmes to enhance brand recognition and to promote products or services;
- Restructuring of the supply chain; and
- Replacing existing assets.

The valuation of many mining assets, particularly precious metal mining assets, based on net present value (NPV) per share and DCF methodology does not generally reflect the value per share ascribed in the marketplace. Companies may trade at a premium or discount to NPV (generally referred to as Price/NPV). The premium or discount ascribed to a company's share P/NPV per share ratio generally reflects the market's perception of risk to that particular company.

It is believed that the premium or discount ascribed takes into account the following:

- Quality of reserves;
- Country and geographical risks;
- Management's track record;
- Leverage of cash flow to metal price and local currency exchange rates; and
- Quality of mining and metallurgical operations.
- Safety record (which at times result in safety stoppages)
- Hedge book size

Cash Flow Return on Investment (CFROI):

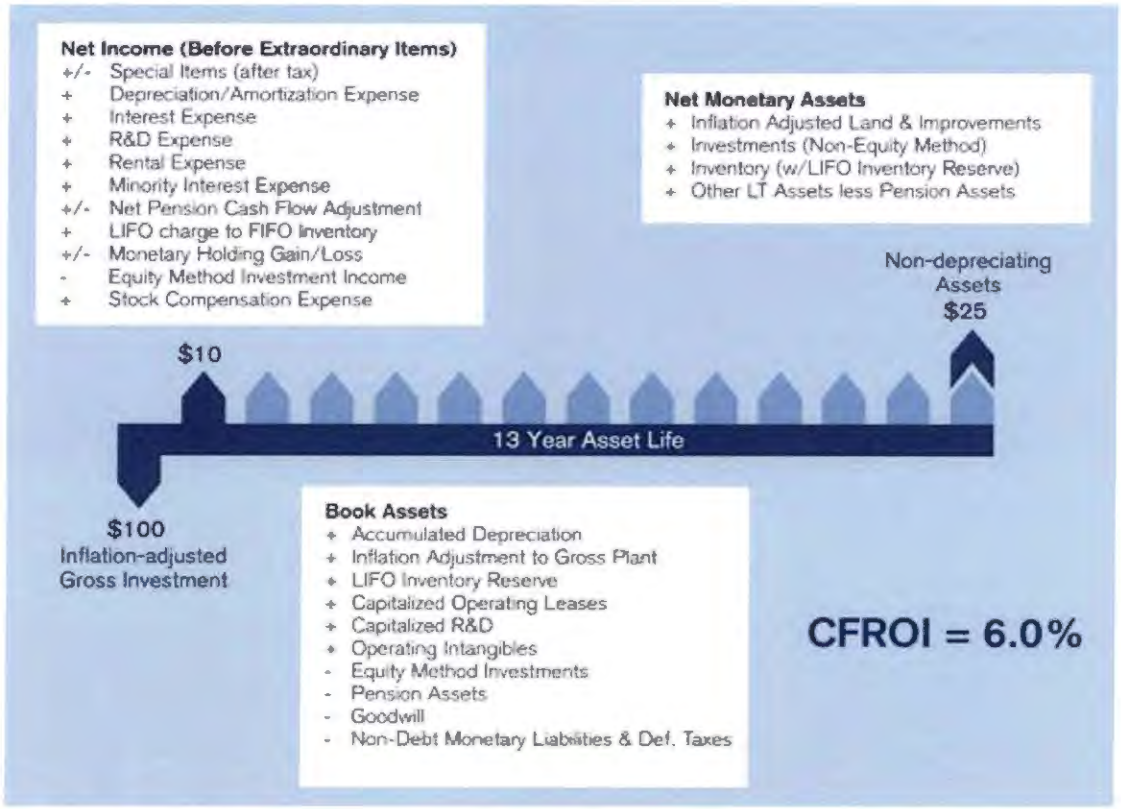
Anon. (2009d) indicates that CFROI is a valuation model that assumes the stock market sets prices based on cash flow, not on corporate performance and earnings.

CFROI is represented by the following formula:

$$\text{CFROI} = \frac{\text{Cash Flow}}{\text{Market Value of Capital Employed}}$$

CFROI represents the cash flow which a company generated in a given period as a percentage of the cash invested in the company's assets. Both cash flow and assets are stated in current monetary terms to adjust for inflation. The asset base is also adjusted to include the capitalisation of operating leases. The cash flow to cash invested ratio is then converted to an internal rate of return measured over the normal economic life of the assets involved. Gillmour (2005:33) states that CSFB Holt, which is licensed to First South Financial Services (FSFS) from CSFB (formerly Credit Suisse First Boston), is a discounted cash flow valuation model, and also a CFROI model, used by institutional clients and corporates in country, sector, company and project analysis. It provides portfolio managers and analysts with a unique framework to measure corporate performance and evaluate stocks. Holt's CFROI corrects many common distortions found in traditional accounting measures of performance, such as: inflation, depreciation method, asset mix, asset life, deferred taxes, pension accounting, research and development, off-balance sheet items, inventory accounting, asset holding gains or losses, acquisition accounting, investments, and revaluations. Thus, true economic wealth creation or destruction can easily be assessed to determine a company's warranted value. Diagram 2.1 below, depicts the model used for CFROI performance measure.

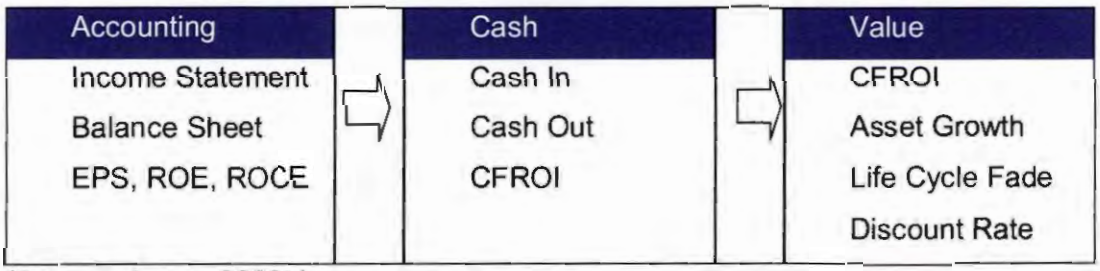
Diagram 2.1: CFROI Performance measure



(Source: Anon., 2009a)

CSFB Holt is constructed on the conceptual framework of CFROI and was developed more than 30 years ago by Bartley J Madden in the USA. Madden believes CFROI is superior to the economic value added (EVA) approach, another popular valuation technique (discussed below), mainly because the historical nature of the Beta that EVA uses in the calculation of cost of capital that can often be flawed. Holt's basic premise is that stock markets set prices based on cash flows, not traditional accounting measures of corporate performance such as earnings per share. As simply illustrated in diagram 2.2, HOLT takes accounting information, converts it to cash and then values that cash.

Diagram 2.2: Converting and valuing accounting information



(Source: Anon., 2009b)

At a simplistic level CSFB Holt measures and values the cash that a business generates and compares it with the cash that it has invested in assets over the economic life of the assets. It incorporates the concept of the industrial lifecycle that most companies and industries display over time. It is normally calculated on an annual basis and is compared with an inflation-adjusted cost of capital to determine whether a corporation has earned returns superior to the cost of capital. CFROIs can be compared across companies (with different asset profiles), borders and time. An advantage is that it ties performance measurement to the factor that capital markets prize most: the ability of a corporation to generate cash flow (Gillmour, 2005:33-37).

Economic Value Added (EVA):

Brigham and Ehrhardt (2005:963) define EVA as a method to measure a firm's true profitability. The literature relating to EVA, literally begins with the publication of the book *The Quest for Value* by Stewart (1991:50), in which the author exposed his views about the usefulness of EVA as the basis of performance measurement of a company and the management at a total or at a divisional level. EVA was introduced and trademarked by Stern and Stewart in the mid 1980s. Erasmus and Lambrechts (2006:15) state that EVA is similar to conventional measures of profit, but with two distinct differences:

- EVA takes the total cost of capital into account; and
- EVA is not constrained by generally accepted accounting principles (GAAP).

Ezzamel and Burns (2005:756) state that EVA is accounting profit less the cost of capital, and Ryan and Trahan (1999:46) define EVA as "a residual income type

measure of economic profit" which measures the excess of earnings over the minimum return that shareholders could get by investing capital in companies of similar risk.

Firms that apply EVA link its metrics upwards to shareholder value and link those metrics downwards to a series of value drivers. BCG-HOLT (Ryan & Trahan, 1999:46) defines value drivers as operating decisions that have a high impact on value and are manageable by the business unit. Ideally, the performance of many employees can be tied to shareholder value by measuring employee impact on a particular value driver.

EVA has been presented as the centrepiece around which the corporate financial management system should be reengineered, as it combines in one number both the balance sheet and the income statement and is claimed to ensure the 'creation of value for ... shareholders' (The Economist, 1997:61). It has been promoted as 'a hot topic ... at the forefront of a trend to manage long-term economic value rather than EPS(Barfield, 1998:49).

Formula for EVA:

EVA = NOPAT (Net operating profit after taxes) – After tax cost of total operating capital

Or

EVA = EBIT (1-Tax Rate) – (Total net operating capital) (WACC)

EVA can also be expressed in terms of ROIC:

EVA = (Operating Capital) (ROIC-WACC)

Where:

WACC	= Weighted average cost of capital
EBIT	= Earnings before interest and tax
ROIC	= Return on invested capital
NOPAT	= Net operating capital after tax

It can therefore be concluded that where the EVA is positive, that the organisation has created value for shareholders; however, a negative EVA implies that management has

destroyed value for the shareholders. Table 2.1 profiles successful and unsuccessful users of EVA.

Table 2.1: EVA Performance measure

Profile of successful users	Profile of unsuccessful users
Autonomous business units	One large business unit matrix organisation Substantial shared resources
Strong managerial wealth, incentives tied to business unit performance	Excessive emphasis on stock options Discretionary approach to compensation
CEO and senior management are enthusiastic advocates	CEO does not realise what he/she signed up for
Business unit's head stay put	Short job tenure for business unit heads

(Source: Young & O'Byrne, 2001:12)

Market Value Added (MVA):

Brigham and Ehrhardt (2005:967) define MVA as the "difference between the market value of the firm and the book value of the firm's common equity, debt, and the market value of preferred stock". It can also be stated that MVA represents the difference between the value of the organisation and the investor supplied capital. A high MVA would therefore indicate that the organisation has created substantial wealth for the shareholders. MVA is equivalent to the present value of all future expected EVAs. Negative MVA means that the value of the actions and investments of management is less than the value of the capital contributed to the company by the capital markets. This means that wealth or value has been destroyed.

Management should therefore endeavour to maximise MVA and not necessarily to maximise the value of the organisation since this can be accomplished by investing ever-increasing amounts of capital.

MVA Formula:

MVA = Market Value of stock – Equity capital supplied by shareholders

= (Shares outstanding) (Stock Price) – Total common equity

Or

MVA = Total market value – Total capital
= (Market value of stock + Market value of debt) – Total Capital

The *q* ratio:

According to Starovic *et al.* (2004:13), the *q* ratio developed by economist James Tobin stands for the ratio of the market value of the firm to the replacement cost of the assets. If the latter is lower than the former, then the company is making a higher than normal return on investment. Technology and human capital assets were traditionally associated with high *q* values.

Formula:

$$\textbf{Q Ratio} = \frac{\textbf{Total Market Value of Firm}}{\textbf{Total Asset Replacement Value}}$$

The market-to-book ratio:

This ratio is used to find the value of a company by comparing the book value of a firm to market value. Book value is calculated by taking the firm's historical cost, or accounting value. Market value is determined in the stock market through market capitalisation.

Formula:

$$\textbf{Book to Market} = \frac{\textbf{Book Value of Organisation}}{\textbf{Market Value of Organisation}}$$

In basic terms, if the ratio is above 1 then the stock is undervalued. If it is less than 1, the stock is overvalued.

Cash Value Added (CVA)

Another VBM metric developed was **Cash Value Added (CVA)**. Value Based Management (2009a) defines CVA as the difference between operational cash flow (OCF) and the operational cash flow demand (OCFD). OCF is the sum of earnings before depreciation, interest and tax (EBDIT), adjusted for non-cash charges like depreciation, working capital movement and non-strategic investments. OCFD

represents the cash flow needed to meet the investor's financial requirements on the company's strategic investments, that is to say, the cost of capital.

2.1.3 Value based management principles

Gilmour (2005:12) defines VBM as a management philosophy that has at the core the understanding that a company's primary goal is to create value for shareholders. Value for shareholders can be created on a sustainable basis only if other constituents such as customers and employees also get value from the business. The measurement of the value being created for shareholders is thus crucial in the implementation of the VBM philosophy. If the correct measure is not chosen, it can lead to incorrect strategy selection and the destruction or limiting of shareholder value. The literature on VBM contains many unsettled and divergent issues, particularly alternative performance measurement theories (Martin & Petty, 2001; Rappaport, 1998; Young & O'Byrne, 2001; Copeland *et al.*, 2000). A large number of companies are proclaiming commitment to create sustainable long-term value for shareholders. On a regular basis, articles with headings such as: *"Managing for Value: It's not just about the numbers", "Maximising Shareholder Value: Achieving clarity in decision-making"* and *"Leading for Value"* are publicised providing information that ranges from case studies of VBM implementations, the types of VBM metrics that should be used or what VBM is all about (Haspeslagh *et al.*, 2001:64; Starovic *et al.*, 2004:1).

VBM emerged from the discipline of strategic management in the late 1970s. Interest in value based methods reflected disenchantment with traditional accounting earnings, although the objectives of each are different. VBM recognised that accounting data was no longer providing a robust insight into business performance. Value based methods are based on the concept that the underlying financial performance of a business is best represented by the change in economic value; that is, the change in the net present value of the expected future cash flows (Koller, 1994:87).

The purpose of VBM is to create a holistic measurement and management process that is designed to facilitate improved organisation performance (Sharman, 1999:1).

However; certain organisation factors could influence managers in selecting and using VBM as performance measurement tools.

The increase in competition in global markets and more active boards of directors have increased pressure on organisations to focus on maximising shareholder value. This has resulted in organisations seeking alternative methods to manage and measure business performance as the traditional accounting system are becoming obsolete and do not precisely determine a business's success.

To understand VBM, one must understand the importance of value creation in an organisation, since VBM is a management process that focuses on creating shareholder value. In the value creation process, future financial performance is the primary interest (Martin & Petty, 2001:7). Past and present information such as profits and balance sheet and income statements are used as a guideline in forecasting the future, but this does not provide a complete picture of the ability of an organisation to bring in future profits or positive cash flow.

Koller (1994:87) describes VBM as focusing on better decision-making at all levels in an organisation, but it is not a staff driven exercise. VBM recognises that top-down command-and-control structures do not work well in large multi-business corporations, but instead calls on managers to use value based performance metrics for better decisions. An indication of whether VBM is working or not, is when decision-makers at all levels are provided with the right information and incentives to make value creating decisions. According to Koller (1994:87), VBM entails managing the balance sheet as well as the income statement, and balancing long and short-term perspectives. In the most basic form, VBM involves transforming behaviour in a way that encourages employees to think and act like owners (Martin & Petty, 2001:2). Companies claim through statements by the CEO, or in the annual financial statements that the company's goal is to create value for the shareholders, but translating the goal into practice is far from easy (Martin & Petty, 2001:2). Value is only created when managers are actively engaged in the process of identifying good investment opportunities and taking steps to capture the value potential of these opportunities. Value creation requires management to be effective in identifying, growing, and harvesting investment opportunities (Martin & Petty, 2001:2).

Ryan and Trahan (1999:47) define VBM as the adoption of a corporate strategy of maximising shareholder value by the management of a company. Ryan and Trahan (1999:47) goes further to state that VBM is, in theory, all-encompassing and includes corporate strategy, management compensation issues, and detailed internal control and reward systems, all designed to link employee performance to shareholder value.

2.1.4 Benefits of value based management

VBM brings tremendous benefits when it is well implemented. According to Koller (1994:87), VBM is similar to restructuring in order to achieve maximum value on a continuing basis, and it has high impact, often realised in improved economic performance.

A value based metric combines the three essential financial characteristics of an organisation; cash flow generated by the organisation, the capital invested to generate those cash flows and the cost of capital of the investment

Value Based Management (2009b) lists the following aspects for which VBM provides consistency:

- The corporate mission (business philosophy);
- The corporate strategy (course of action to achieve corporate mission and purpose);
- Corporate governance (who determines the corporate mission and regulates the activities of the corporation);
- The corporate culture;
- Corporate communication;
- Organisation of the corporation;
- Decision process and systems;
- Performance management processes and systems; and
- Reward processes and systems.

VBM offers workers an opportunity to participate as first-class shareholders in the company's equity growth, and in monthly and annual profits on a profit centre basis.

Experience has shown that where reinforced by a VBM culture, people become empowered to make better decisions, discipline their own behaviour, and work together more effectively as a team. Thus, each person contributes, risks and shares as an owner as well as a worker. VBM helps unite everyone's self interest around the company's bottom-line and corporate values (Pienaar, 2008:26-30).

VBM would therefore call for a new style of leadership. It holds that a genuine leader sees himself or herself as the ultimate servant and a teacher, one who empowers others to realise their hidden potential, not one who rules by fear or refuses to be accountable to others.

2.1.5 Organisational culture

Coetsee (2003:35) states that management starts with the development and formulation of goals, which must then be cascaded down towards team members in such a way that they perceive it to be their own. Shared values are instrumental in creating commitment and represent the essence of an organisation. These values dictate the "how-we-do-things-around-here". When a person walks into an organisation one tends to get a certain "feel" for it, whether it is fast moving and responsive or not. Culture is about how the organisation is being organised; the rules, procedures and beliefs make up the culture of the company.

Creating value is not a once-off event that comes about as a result of a major strategic breakthrough. It is a continuous cycle, supported by the sum of strategic and operational decisions made throughout the company. Starovic *et al.* (2004:18) proclaim that for it to be effective, each one of those decisions and interventions, however small, needs to be informed by principles of VBM. The only sustainable, organic way to make this happen is if VBM is embedded into a company's DNA, to such an extent that VBM becomes second nature. Managers tend to assume that if VBM metrics are being measured and reported, the performance will somehow improve and the markets will reward such actions accordingly. Companies can not only measure too much, they can

also measure the wrong thing. In their seminal article for the Harvard Business Review, researchers from the INSEAD business school concluded that the key to successful implementation of VBM is a focus on culture rather than finance (Starovic *et al.*, (2004:19). Culture encompasses all of the implicit norms and ways of behaving that direct employee actions. These tend to have more influence on what happens day-to-day than official edicts from senior management, which may not get past a read and forgotten all-staff memo.

That is why change, particularly cultural change, is so difficult to get right. The INSEAD study highlights five elements of cultural transformation shared by companies where VBM programmes have been successful:

- Nearly all made an explicit commitment to shareholder value.
- Through training, these businesses created an environment receptive to the changes that the programme would engender.
- Reinforced training with broad-based incentive systems that were closely tied to the VBM performance measures and which gave employees throughout the company a sense of ownership in both the company and the programme.
- These organisations were willing to make major changes that would allow workers to make value creating decisions; and
- The changes that were reduced to the company's systems and processes were broad and inclusive rather than focused narrowly on financial reports, thus one can conclude that VBM is a sphere where people (soft issues) and financial numbers come together. In this sphere, it is imperative to communicate financial results down to the "bottom" of an organisation.

An important module of an organisation's culture is employee stock option plans (ESOP). The notion of 'benefit sharing' has become an important guiding philosophy in recent years. For a company, this means that all interested parties are recognised when addressing the fundamental question of 'what are we trying to do in this business?' The idea is that, by giving different parties – for example, managers, other employees, customers and suppliers – the chance of sharing in the benefits accruing to a firm, everybody will be better off. But how does someone define 'better off'? To answer this, a company must consider first whether there should be one overall objective or a series

of objectives (a 'scorecard') and then how to measure performance against the objectives. In other words, briefing the board and senior managers is not enough. There needs to be a comprehensive and regular communication programme involving all employees. Value is created throughout the company, not just at the top, so the relevant aspects of VBM need to be adapted to the individual context of a particular role. Visible leadership and strong commitment at the top is essential.

To conclude, changing the way performance is measured and reported, is largely a contained, if not entirely straightforward, exercise. Yet, it is only a relatively small part of VBM implementation. Changing the culture is more open-ended and potentially messy. It is also the only way companies can inspire the kind of commitment necessary to make VBM more than a passing fad.

2.1.6 Organisational structure

Collins (2001:63) is convinced that effective organisations began by "getting the right people on the bus and the wrong ones off" and then figure out where to drive. Collins liberally makes mention of the "genius with a thousand helpers" model. This model describes a competent leader who sets a vision and then enlists a number of highly capable "helpers" who ensures the vision happens. Kotzé (2008:70) defines competent leadership as "influencing and directing the behaviour of individuals and groups in such a way that they work willingly to pursue the objectives of the organisation". This model normally fails when the leader departs. This is in stark contrast with what Du Plessis (2008:5) professes where it claims that strategy should follow structure.

Therefore, depending on which approach (of the two listed above) taken, the organisation could face a challenge whereby, according to Wikipedia (2009), the set organisational structure might not coincide with facts, evolving in operational action. Such divergence decreases performance, when growing, for example a wrong organisational structure may hamper cooperation and thus hinder the completion of orders in due time and within limits of resources and budgets. Organisational structures shall be adaptive to process requirements, aiming to optimise the ratio of effort and

input to output. The organisation structure can be described as being effective, and strategy supportive, if it facilitates the following desirable results (Kotzé, 2008:40):

- Efficiency;
- Effectiveness;
- Strategy support;
- Excellent horizontal and vertical communication;
- Realisation of the full, practically-realisable benefits of the optimum trade-off between centralisation and decentralisation;
- Development, maintenance and establishment of core competencies within the organisation; and
- Aligned commitment on all organisational levels.

High performance and aligned employees are often output and value focused. The primary concern of this dissertation falls on output relative to input of teams and individuals as opposed to tasks performed by teams and individuals. Kotzé (2008) states that outputs are normally defined in the key performing areas (KPA) and measured by the key performance indicators (KPI). A KPA fits into the organisation's strategic objectives and forms part of the key success factors of an organisation. Table 2.2 illustrates a typical KPA (safety, production, costs, number of employees) and the corresponding KPIs (fatalities, lost time injuries, square meters mined, and others) for a mine. The report depicts predetermined KPAs and KPIs for a certain period.

Table 2.2: Examples of KPAs' and KPIs' impact

KPA	KPI	Units	September 2009				
			Budget	Actual	Var	Key	Var %
Safety	Fatalities	No	-	-	-	☺	
	LTI	No	5	12	7	☹	140%
	L.T.I.F.R	Rate	1.6	3.4	**1.73**	☹	106%
	Total Injuries	No	0	12	**12**	☹	
Production	Square metres	m² ('000)	19.3	15.9	**(3.4)**	☹	**-18%**
	Total development	m² ('000)	0.8	0.6	**(0.2)**	☹	**(24%)**
	Tonnes delivered to concentrator	t ('000)	70	72	2	☺	2%
	4E Oz (M&C)	Oz ('000)	11.9	11.0	**(0.9)**	☹	**(8%)**
	Equivalent refinded Pt Oz	Oz ('000)	6.9	8.5	1.6	☺	22%
Costs	Direct On-Mine (**Cost 1**) Unit Cash Costs	R('000)	200.0	210.0	10.0	☺	5%
	Direct Off-Mine Unit Cash Costs	R('000)			-	☺	
	Total Unit Costs (Cost 4)	R('000)			-	☺	
Labour	Own Labour	No	2,482	3,880	**-1,398**	☹	**-56%**
	Contractors & labour hire	No	576	486	90	☺	16%
Bottom Line	Operating Free Cash Flow	R('000)			-	☺	
	GPOMS (Re-calculated)	R('000)			-	☺	

(Source: Own research)

2.1.7 Strategy

Kotzé (2008:12-13) defines strategy as the managerial game plan of business where investment priorities are established, whilst strengthening and building the company's long-term competitive position in the market. Kotzé (2008:38) further states that, high performance begins with an appropriate and winning strategy. Kotzé (2008:38) outlines that during the formulation of appropriate and winning strategies, three additional elements of peak performance are developed. These elements are:

- Objectives;
- Vision statement; and
- Core values.

Kotzé (2008:42) identifies a shared value system which guides the behaviour of employees, as a pre-requisite to aligned commitment. What are required are values that pervade the organisation and that establish the guidelines under which the enterprise's decisions, actions and opinions are framed. However, according to Kotzé, (2008:42), it

is more difficult to identify, communicate and shape core values than it is to articulate and advocate a strategic vision.

2.1.8 Linking compensation to performance measurements

Organisations create value for shareholders when they invest in projects, products, services or strategies that are expected to earn returns greater than the cost of capital. In other words, companies create value for shareholders when companies undertake projects with a positive NPV. Companies use free cash flow models to determine if NPV is positive or negative. Investors invest funds based the future expectations of the company and managers are compensated based on past performance of the company. Management might, therefore, be paid to be concerned with things that do not create value. When management does not own the company it is supposed to manage, or own only a small percentage of outstanding shares, it is hardly surprising if value creation is not management's top priority.

VBM is a return to economic values in assessing the performance of the firm and places the concerns of shareholders above others. Ultimately, it maintains that an organisation's strategy should be tested, based on whether it adds value for shareholders. Value based measures such as EVA has developed as a way to measure shareholder value. Shareholder value, a key corporate objective of many companies, is achieved when the return from capital employed in the business is greater than the cost of obtained funds. Although it is widely accepted in the accounting community, shareholder value is not always taken into account in practice. Some managers are too often pre-occupied with other objectives such as growth in turnover, size, accounting earnings and market share. Does a shift in sales growth really matter? That depends on whether a company generates returns on growth investments that exceed cost of capital. If a company earns exactly the cost of capital then obviously, will such growth not matter? Likewise, if returns fall below the cost of capital, then growth destroys value. Therefore, growth can be good news, bad news, or no news. However, although the pursuit of such objectives may benefit managers, it may also destroy shareholder value (Brigham & Ehrhardt, 2005:110-114; Pienaar, 2008:44-60). Traditionally, performance in this area has been measured on capital employed and return on

investment. However, these have been criticised for many reasons, including being backward-looking, open to manipulation or prone to difficulties due to different accounting procedures. EVA as a performance measure tool takes the post tax profits as well as the cost of equity into consideration and can also be used as a measurement tool across the organisation to determine all levels of management's effectiveness. EVA cannot be determined at all departmental levels of the business unit thus components that make up EVA such as square meters mined per employee, platinum produced per employee or cash spend per ounce of metal produced could be used. A suggested advantage of the VBM approach is that it ensures that a business has a single overriding financial objective. Performance measurement systems tend to have multiple measures stemming from multiple objectives. Therefore, conflicting objectives can lead to performance measures that require trade-offs. To some extent, the VBM approach does not require such trade-offs because shareholder value is the primary objective of the firm and all planning and control systems are consistent with this. A survey by the American Institute of Certified Public Accountants (AICPA) (Maisel, 2001:1) highlighted the circumstances that would cause a company to consider revising performance measures. The drivers of change are listed below in descending order:

- Decrease in profitability;
- Change in strategy;
- Enhance shareholder value;
- Redesign of business processes;
- New technology;
- New competition; and
- Attract/retain people.

Starovic *et al.* (2004:17) state that remuneration policies frequently form a central plank of VBM programmes. Research done by PA Consulting (Starovic *et al.*, 2004:18) investigated the correlation between total shareholder returns and the remuneration practices commonly associated with VBM. The following practices were examined:

- The bonus system rewards improvement at any level of performance – there is no cap on the bonus payable.
- Staff are in a shareholder value based bonus system.

- The business defers part of the bonus payout over several years; and
- Many staff have built up shareholdings in the business, through purchases or bonuses, which are a significant part of their total wealth.

It was found that the most significant positive correlation with the last two points, which seem to deliver additional total shareholder returns of 2 and 4 per cent per annum, respectively. The link between reward and motivation is far from straightforward, despite the widespread recognition that remuneration is one of the main influences on how people behave at work. The sheer number of motivational theories is enough of a testament to this, as is the complexity of remuneration packages awarded to directors and executives in particular. It is hardly surprising that a whole industry has mushroomed around remuneration consulting and that the subject continues to provoke an emotive response from companies, investors and the general public alike.

Measurement of performance

Accepting value creation as the paramount corporate goal is only a start to VBM. Management must also be able to measure the progress in achieving value creation. Determining the measurement criteria and establishing rules and guidelines to interpret the results is important in the early stages of designing and implementing VBM. According to Hough (2005:2), there has been an increase of "management tools and measurement techniques". It is further claimed that one of the areas of improvement was the area of performance management. The first reason for this improvement was the realisation that value creation drivers shifted from tangible assets (plant, property, equipment, stock, and more) to intangible assets (company culture, innovation, intellectual property, and more).

All approaches to performance measurement should emphasise the alignment of objectives, measures, strategic decision-making and rewards. This is crucial, as it is not possible to measure performance unless it is clear what an organisation is trying to achieve. A sound performance measurement system will cascade down to the lowest level employee in the organisation. It should be integrated with the overall business strategy and so ensure that all stakeholders are working together in the same direction. Following the identification of strategic objectives, an organisation should agree the key factors and activities that are critical to achieving the objectives and those areas in

which the organisation must excel in order to ensure success. Underpinning the critical success factors will be activities or competencies that are essential to outperform the competition, like quality of the final product at the lowest possible cost whilst not injuring any employee in the process. Performance targets can then be developed for the activities.

Many new frameworks and techniques have been developed recently to address some of the issues discussed in the preceding sections and in response to the rocketing interest in performance measurement. The techniques are not mutually exclusive; for example, activity and value based measures can be used as indicators in a balanced scorecard, which can, in turn, be implemented using a strategic enterprise management system. Arguably, these frameworks add value by offering a different perspective on performance rather than a comprehensive one.

The Balanced Scorecard supplemented traditional financial measures with criteria that measured performance from three additional perspectives – those of customers, internal business processes, and learning and growth. It therefore enables companies to track financial results while simultaneously monitoring progress in building the capabilities and acquiring the intangible assets it would need for future growth.

The scorecard was not a replacement for financial measures; it was complementary. Managers using the balanced scorecard do not have to rely on short-term financial measures as the sole indicators of the company's performance.

Originally developed by Kaplan and Norton (1992:71-79) in the early 1990s to measure private industry non-financial performance, the Balanced Scorecard (BSC) offers the opportunity to manage tangible and intangible assets and create sustained and high performance business cultures. The BSC has been adopted by both the private and public sector. An observed benefit by the BSC has been the incorporation of the management and execution of business strategy, to the emphasis management puts on financial and non financial performance.

Effective performance measurement is of key importance in ensuring the successful implementation of an organisation's strategy. The measurement is about monitoring an

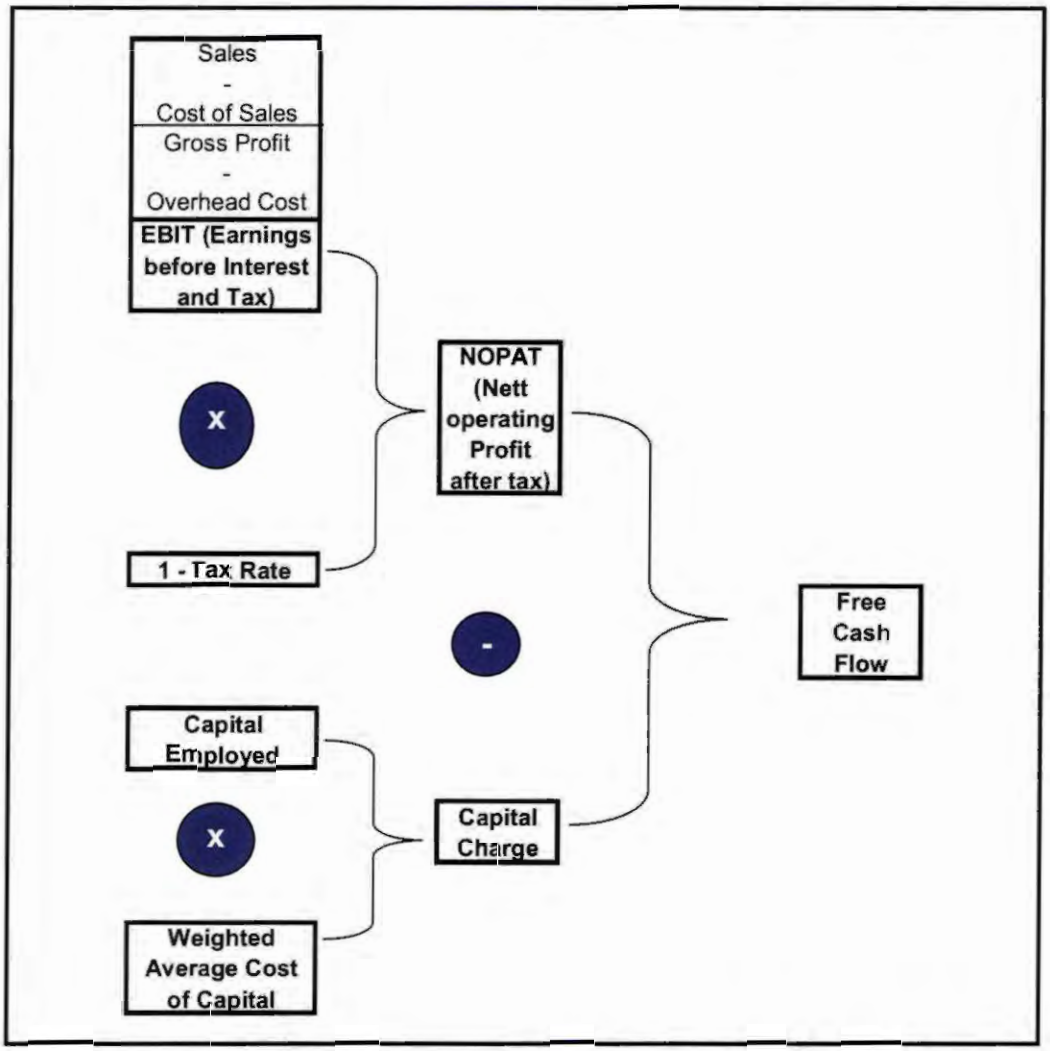
organisation's effectiveness in fulfilling the predetermined goals or the requirements of stakeholders. In order to be successful, today's company must perform better, not simply in terms of cost but also in other dimensions such as quality, flexibility, value and so on. A performance measurement system that enables it to meet these demands successfully is essential as it helps ensure that decision-making at strategic and operational level is better informed and more effective. Comparison of outcomes against objectives enables the identification of problems so that timely corrective action can be taken.

Activity-based costing (ABC)

Chase *et al.* (2006:753) define ABC as "some method of allocating overhead cost to production activities". According to the authors, ABC techniques have been developed and refined to more directly reflect actual proportions of the overhead consumed by the production activity. Cost drivers are used to allocate cost. Garrison *et al.* (2006:316) defined ABC as a costing method that is designed to provide managers with information for strategic and other decisions that potentially affect capacity and therefore fixed cost.

ABC is not used to prepare external financial statements, but is used as an internal tool. Garrison *et al.*, (2006:316) further state that the objective of ABC is to "understand overhead and the profitability of products and customers and to manage overhead." According to CIMA (2002:9), the focus of ABC is on the activities and processes within an organisation and is based on the principle that by controlling the activities that consume resources, costs can be controlled at the source. Since ABC deals with the allocation of costs in the income statement and the cost aggregates to cost of sales and overhead cost, it directly impacts on free cash flow (FCF) because EBIT = sales – +cost of sales = gross profit – overhead cost, as illustrated by diagram 2.3 below.

Diagram 2.3: NOPAT Calculation

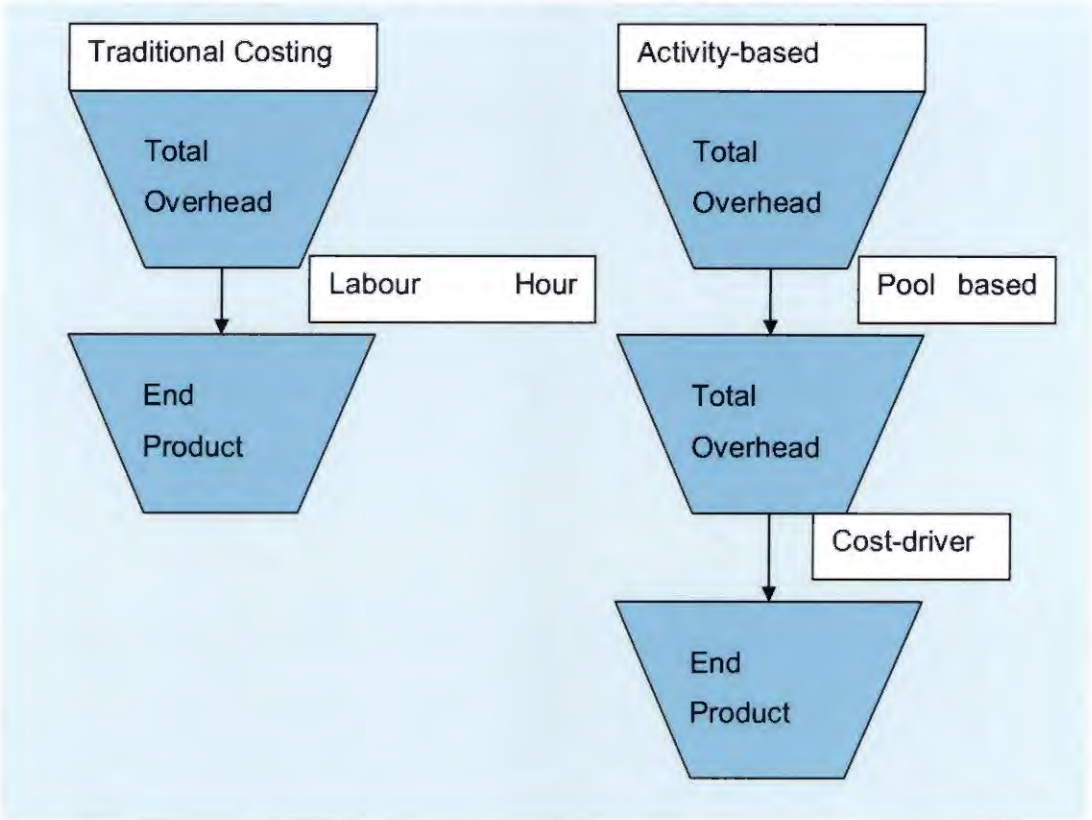


(Source: Own research)

After ABC has provided accurate information about the true costs of those activities, activity based management (ABM) makes use of this information through value analysis and performance measures which support strategic and operational decision-making. Where ABM is implemented it can provide the data needs to plan and direct improvement activities and eliminate waste.

ABC overcomes the problem of cost distortion by creating a cost pool for each activity that can be identified as a cost driver, and by assigning overhead cost to products or jobs on a basis of the number of separate activities required for completion. Diagram 2.4 illustrates the differences between ABC and traditional costing.

Diagram 2.4.: Traditional and activity based costing (ABC)



(Source: Chase *et al.*, 2006:754)

2.1.9 Benefits of value based management

Although the process of VBM implementation takes time and is difficult, there are significant benefits that organisations will realise (Haspeslagh *et al.*, 2001:65):

- Organisations will make better and smarter strategic decisions;
- Managers are dedicated to the long-term sustainability of the organisation in creating shareholder wealth; and
- There is alignment between the actions and decisions of employees and the strategy of the organisation.

The benefits of VBM can be summarised as (Starovic *et al.*, 2004:22):

- It provides a single objective internally and externally namely shareholder value creation;
- The metrics are powerful tools to use for measurement and as comparatives for benchmarking;
- VBM assists in allocating resources to what matters i.e. value creating activities;
- VBM has a positive effect on financial performance;
- VBM is a powerful strategic tool;
- It assists in focusing management on the core value drivers; and
- Employees act as if they are the owners of the business.

2.1.10 Critique of value based management

The financial meltdown that was experienced at the end of 2008 and the beginning of 2009, as mentioned in chapter 1, has been accompanied by increasing criticism over the basic model of management — that of shareholder value maximization — which has guided most companies during the past two decades. The shareholder value maximization model holds that the primary goal of the firm is to maximize its market value and implies that business decisions should seek to increase the net present value of the economic profits of the firm.

Putting aside philosophic and ethical objections to shareholder value maximization (e.g. undesirable pursuit of profit and wealth), Grant (2009:1) identify three undesirable consequences of shareholder value maximization:

- To increase stock market value, firms have substituted (low cost) debt for (high cost) equity, failing to consider the risk implications—especially during economic downturns;
- An emphasis on short term financial performance over the long-term development of the business; and

- It has provided a convenient cloak for self-enrichment by senior executives. To "align management incentives with shareholder interests," CEOs have been awarded massive stock option and bonus packages while presiding over massive destruction of shareholder value.These problems are the result of the way in which shareholder value maximization has been interpreted and applied, not problems of the model itself.

According to Koller (1994:88) VBM can become a staff-captured exercise that has no effect on operating managers or on the decisions that these operating managers make. It is critical that these operating managers are incorporated in the VBM process, as the real decisions are made by these managers. The critique of EVA as VBM metric is that it is cumbersome to determine the value of some of the underlying calculations and assumptions reliably which forms the basis of EVA results. Lawrie (2003:6) illustrate this by using the calculation of the cost of capital that applies to a particular business unit within a business as an example to illustrate that the values for such a calculation is notoriously difficult to estimate. Ehrbar (1999:36) bemoans the incompetibalitiy of earnings-based managerial decisions and owner wealth creation.

The drawbacks of VBM, according to Anon. (2009e), are the opposite of benefits, and are as follows:

- VBM is an all-encompasing management philosophy and in most cases requires culture change at the business unit and the organisation at large. VBM roll out can be resource consuming and requires tolerance on all levels of the organisation;
- Value creation is more or less the same as corporate strategy;
- Economic value added, performance management and Balanced Scorecard are very powerful management support tools and processes, but have its own costs;
- It should not be assumed that VBM is a "one size fits all" management approach and the management of things that count needs to be encouraged;
- VBM requires strong and explicit top down support and buy in;

- VBM may rely on external consultants that work independently from the requirements at the operations;
- It is crucial that the key staff members are trained comprehensively, such training can be costly and time consuming ; and
- Since VBM works on an trial and error basis it should be noted that the perfect VBM or valuation model has not been invented yet. Any method chosen will have certain drawbacks, which should be considered.

Starovic *et al.* (2004:22) list the following disadvantages:

- The different definitions and metrics proposed complicate VBM.
- Difficulties exist to take VBM metrics to lower levels within the organisation.
- It is a costly exercise that takes time, resources and commitment; and
- The metrics can become complex and difficult to understand and manage.

Lew and Barnard (2004:20) indicates that one of the shortcomings of VBM is that it lacks the connection with interventions that focuses mainly on people. because value creation relies not only on the strategy and an understanding of the business drivers, but also the buy-in of all employees.

From the author's personal experience, it was noted that in some instances any initiative undertaken by an organisation normally hinges upon one or a few individuals. So when one of them resigns from the company's employment such an initiative falls flat.

2.1.11 Shareholder value

To "claim" the goal of creating share holder value can be easier said than done. Even where there is agreement that enhancing shareholder value is the correct thing to do, according to Martin and Petty (2001:2) there are always divergent opinions about how best to implement the goal.

Shareholder value creation should be the primary goal of the firm, the basic criterion for decisions, and means by which management keeps score of performance, but is not a substitute for business purpose. Grant (2009:1) states that "evidence shows that the most successful long-term builders of shareholder value are companies with a clear sense of purpose". Shareholder value is inadequate as a purpose for the firm partly because it fails to inspire and partly because it fails to offer strategic direction. Shareholder value is created by supply and demand forces on the stock market and not by management. The task of management is to generate the economic profits that will be capitalized into shareholder value through focusing the firm on exploiting the mission that guides the organisation towards the establishing competitive advantage.

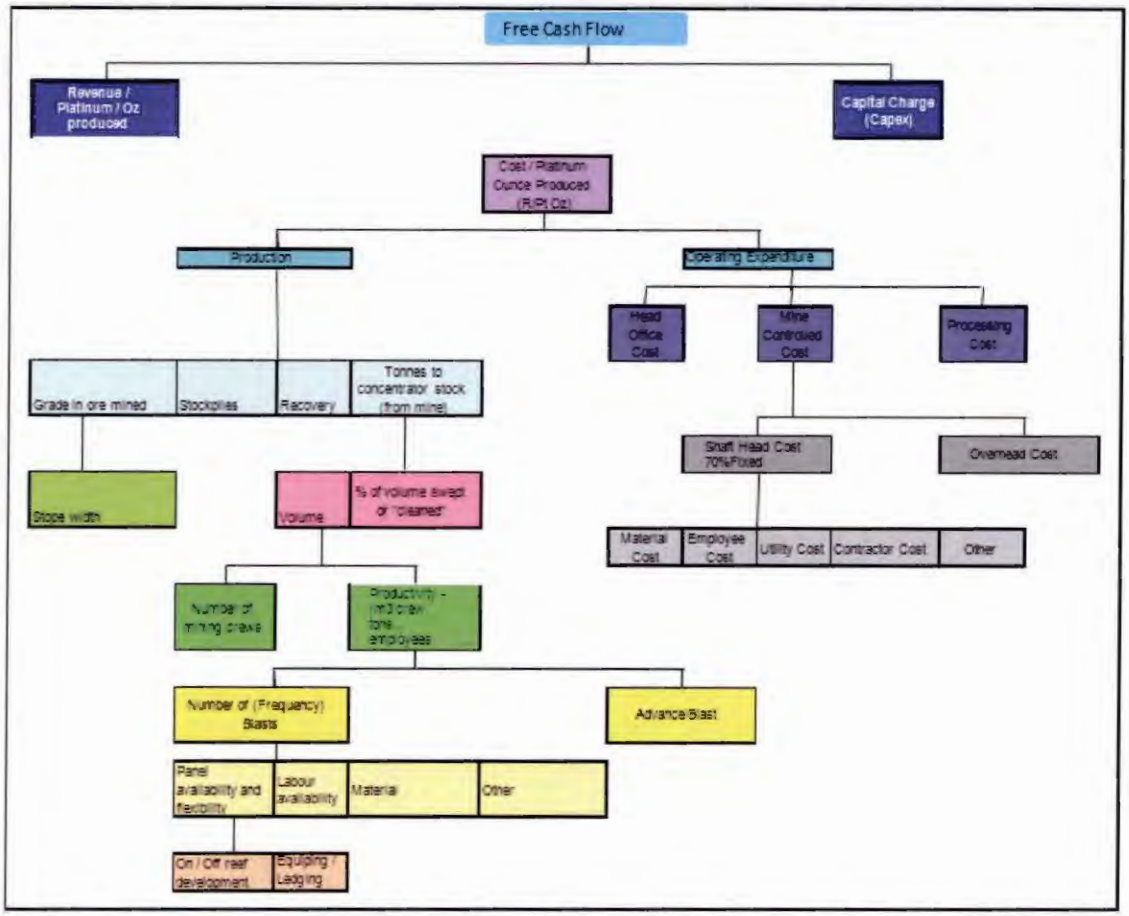
Shareholder value has long been the the focal point of financial economist, but the conversation has now moved from the classroom to the boardroom, where investors are no longer willing to sit on the side and watch, they want access to the boardroom in order to stimulate the performance of the company.

2.1.12 Value drivers

If one want to manage for shareholder value, the first thing is to identify the drivers of shareholder value in the capital market. One of the major issues that can crop up involves wheter shareholder value reflects an organisations' periodic results or encompasses the future cash flow generation potential for the organisation.
According to Koller (1994:91) it is essential to gain a deep understanding of what the performance variables are that create value. It is crucial that an organisation act on the things that it can influence i.e. quality mining, cost and capital expenditures, and through these drivers senior management learns to understand the rest of the organisation. These performance variables are known as value drivers, and these variables can be anything that affects the value of the company.

Diagram 2.5 shows the value drivers for a mining shaft and the different levels at which these drivers are relevant.

Diagram 2.5: Levels of value drivers for a mining shaft



(Source: Own research)

The value drivers of productivity and subsequently economic profit or Free Cash Flow (FCF) of a mining company is not exhaustive, but from the above it can be grouped to mainly labour numbers (number of employees), production, cost of production and capital spend. It is important to remember that the value drivers need to be frequently reviewed because of changes within the organisation as well as external influences, such as competitor's actions, economic changes, regulatory changes and others. The process of identifying key value drivers can be difficult, because it requires an organisation to think about processes in a different way, and, according to Koller (1994:95), existing reporting systems are often not equipped to supply the necessary information.

It also requires a different and creative way of thinking, and it is a cumbersome process of trial and error until the right value drivers are identified. Hall (2003:20) writes that value drivers depend on each company's unique situation and that value drivers need to be broken down to operating level. It is just as important to remember that value drivers should not be considered in isolation, because many of these value drivers are somehow linked to each other, and by focusing on one, it might have a negative effect on another one.

For employees to be able to act like managers and also to make decisions that will create value, they need to understand how their decisions and actions will impact on the value creation process of the organisation. If employees of the organisation are rewarded based on the value they create, it will be critical for them to understand the value creation process. Most organisations battle to articulate the core goals and objectives of the organisation to employees.

Any change within the organisation requires communication and sometimes training and education. According to Knight (1998:266), VBM is no exception. The success of the VBM implementation will depend on the quality and effectiveness of the education, communication and training.

Harris (2002:4) believes that the company should create connections to all employees to ensure that VBM gets properly communicated. Organisations need to commit time and resources in the development and conducting of training and education (Knight, 1998:266). The training and education courses need to be customised for the organisation to have maximum impact and return.

To be effective, the training and education need to be customised for the various roles of the organisation. Education, communication and training are not a once-off exercise. It needs to be ongoing. Behaviour will not change if employees are only exposed to it once. According to Knight (1998:269), a successful communication plan includes the four R's:

- Repetition – once-off messages are ineffective, and to be successful the message needs to be delivered repeatedly. The effectiveness of repeating the same message within television advertisements comes to mind.
- Reinforcement – there needs to be periodic reinforcement from management of the importance and the buy-in into VBM. This will continue to build the usage of VBM within the daily decision-making process and also reinforce the focus on value.
- Reception – the success of the VBM programme depends on how well it is received by employees. Without the necessary training and education, employees will not understand and buy in into VBM; and
- Redundancy – the concepts of value must be implemented in as many activities of the organisation as possible. This will increase the amount of time that employees will be exposed to VBM within their daily activities.

According to Starovic *et al.* (2004:19), the difference between successful VBM implementation and unsuccessful VBM implementation is not the amount that is spent on training and communication, but the effort and consistency that have been put into the communication of results and to train the various levels of staff so that they would understand the underlying principles of creating value for shareholders.

2.2 PRODUCTIVITY

Since labour cost account between 50% and 70% of a mining company's total expenses (Froneman, 2009:4) it stands to be argued that any mining company would want to optimise its workforce by monitoring its productivity levels and seek ways to improve on productivity.

Cronje *et al.* (2007:574) warn that the concept of productivity and productivity improvement are frequently misinterpreted. Any discussion would therefore first necessitate clarity on the meaning of the two concepts. Cronje *et al.* (2007:574) define productivity as the ratio between goods produced and resources used to produce these. A general definition is that productivity is the relationship between the output generated by a production or service system and the input provided to create this output. Thus

productivity is defined as the efficient use of resources in the production of goods and services.

Productivity can be represented by the following equation:

$$\textbf{Productivity} = \frac{\textbf{Outputs}}{\textbf{Inputs}}$$

For example: In the mining industry, productivity can be expressed as m^2 / employee
Productivity improvement from one period to another is represented by an increase in the output/input ratio in the second period compared to the first. Cronje *et al.* (2007:575) state that there are five ways in which productivity improvement can be achieved:

- Increased output is achieved with fewer inputs.
- Increased output is produced with the same inputs.
- The same outputs are produced with fewer inputs.
- A smaller output is produced with even fewer inputs; and
- A larger output is produced with more inputs, but the marginal increase is higher on output than on input.

Therefore, from the above definition of the concept of productivity, it is apparent that an improvement in quality (like a grade improvement) also implies a productivity improvement, as improvement of grade will result in a greater output with the same mining resources, for example labour. The resultant will be greater productivity which will result in value creation. Neo-classical economists would define value maximisation as the single objective for all firms as this is when social welfare is maximised. Value is created when firms convert inputs into outputs of a higher value. In a theoretical or economic world, product and factor markets are perfect and complete. All inputs and outputs have prices, and capital assets have values and rental costs and income, so value is well defined. In addition to defining value at a point in time, one can look at the increment in value for a firm from one period to another. However, in the real world one cannot use the economic model. The aim for a company should be value maximisation and that structures must be put in place to ensure that all constituents are considered. Value cannot be created if the company does not have good relations with all relevant stakeholders.

Ouyang and Chang (2000:598) state that quality is recognised as one of the key factors of the cost and value of a product, and therefore quality has been highly emphasised in modern production management systems. In competitive markets participants regard improving quality as an effective way to cultivate market share. This is evident in the current cut-throat competitiveness, mainly resulting from global trade, which is characterised by a continuous race for lead times, quality and costs mastering. This implies that an evolution of productivity strategy, methods, measurement techniques, design methods, production management methods and manufacturing methods is required.

Chase *et al.*, (2006:29) state that a productivity strategy would focus on:

- **Improve cost structure:** Lowering direct cost of production, reduce indirect cost and share resources with other business units.
- **Improve asset utilisation:** Reduce the working and fixed capital needed to support a given level of business by more efficient utilisation, more careful acquisition, or disposal of parts of the current fixed asset base.

Chase *et al.* (2006:29) argue that cost and productivity will be less emphasised by organisations in early stage start-up mode, as these organisations spend heavily to develop and launch new products and to explore new markets. Companies at the mature end of its lifecycle will emphasise cost reduction or containment and asset utilisation because opportunities to expand into new markets might be limited. However, both Minassian (2009:1) and Esterhuizen (2009:1) concur that productivity improvements generally follow shortly after revenue declines or margin squeeze, because cost increases faster than revenue mainly as a result of above inflationary increases on wages and electricity. Focus on productivity is therefore generally a response from companies to a dropping margin. Usually, when margins are wide and times are good, productivity slips and gets progressively worse over time. Therefore, productivity improvements will usually follow after the share price has already been hammered. The aim of improving or maintaining of productivity, therefore, would be to increase or sustain economic profit. Organisations should not blindly "aim to improve productivity" but should agree which value drivers can and should be used to increase productivity. Productivity measures like labour cost per employee in service should be

measured against a predetermined reference point which takes into consideration factors like inflation. Anglo Platinum (2009:21) has adopted the following standard operating procedure in order to calculate the net benefit by using variance analysis on its agreed initiatives (Refer to diagrams 2.6 and 2.7):

Diagram 2.6: Variance Calculation Model – Cost

Previous Cost	$V_1.Q_1.U_1.I_1.C_1.P_1.E_1$	
	$V_2.Q_1.U_1.I_1.C_1.P_1.E_1$	Volume Variance = $(V_2-V_1).Q_1.U_1.I_1.C_1.P_1.E_1$
	$V_2.Q_2.U_1.I_1.C_1.P_1.E_1$	Quality Variance = $V_2.(Q_2-Q_1).U_1.I_1.C_1.P_1.E_1$
	$V_2.Q_2.U_2.I_1.C_1.P_1.E_1$	Usage Variance = $V_2.Q_2.(U_2-U_1).I_1.C_1.P_1.E_1$
	$V_2.Q_2.U_2.I_2.C_1.P_1.E_1$	Inflation Rate Variance = $V_2.Q_2.U_2.(I_2-I_1).C_1.P_1.E_1$
	$V_2.Q_2.U_2.I_2.C_2.P_1.E_1$	Commodity Index Variance $V_2.Q_2.U_2.I_2.(C_2-C_1).P_1.E_1$
	$V_2.Q_2.U_2.I_2.C_2.P_2.E_1$	Price Variance = $V_2.Q_2.U_2.I_2.C_2.(P_2-P_1).E_1$
Final Cost	$V_2.Q_2.U_2.I_2.C_2.P_2.E_2$	Exchange Rate Variance = $V_2.Q_2.U_2.I_2.C_2.P_2.(E_2-E_1)$

(Source: Anglo Platinum, 2009:29)

Diagram 2.7: Variance Calculation Model – Revenue

Previous Revenue	$Sales_1.I_1.P_1.E_1$	
	$V_1.G_1.R_1.I_1.P_1.E_1$	Inventory Variance$_1$ = $(V_1.G_1.R_1-Sales_1).I_1.P_1.E_1$
	$V_2.G_1.R_1.I_1.P_1.E_1$	Volume Variance = $(V_2-V_1).G_1.R_1.I_1.P_1.E_1$
	$V_2.G_2.R_1.I_1.P_1.E_1$	Grade Variance = $V_2.(G_2-G_1).R_1.I_1.P_1.E_1$
	$V_2.G_2.R_2.I_1.P_1.E_1$	Recovery Variance = $V_2.G_2.(R_2-R_1).I_1.P_1.E_1$
	$Sales_2.I_1.P_1.E_1$	Inventory Variance$_2$ = $(Sales_2 - V_2.G_2.R_2).I_1.P_1.E_1$
	$Sales_2.I_2.P_1.E_1$	Inflation Variance = $Sales_2.(I_2-I_1).P_1.E_1$
	$Sales_2.I_2.P_2.E_1$	Price Variance = $Sales_2.I_2.(P_2-P_1).E_1$
Final Revenue	$Sales_2.I_2.P_2.E_2$	Exchange Rate Variance = $Sales_2.I_2.P_2.(E_2-E_1)$

(Source: Anglo Platinum, 2009:29)

Where:

V = volume, in terms of output (e.g. tonnes hauled);

Q = quality of output (e.g. haul distance);

U = rate of usage of input (e.g. grams per ton*);

I = inflation index;

C = commodity index (net of inflation);

P = price (net of inflation and commodity index);

E = exchange rate;

G = grade (typically grade of ore);

R = recovery of grade to final product;

1 = previous period; and

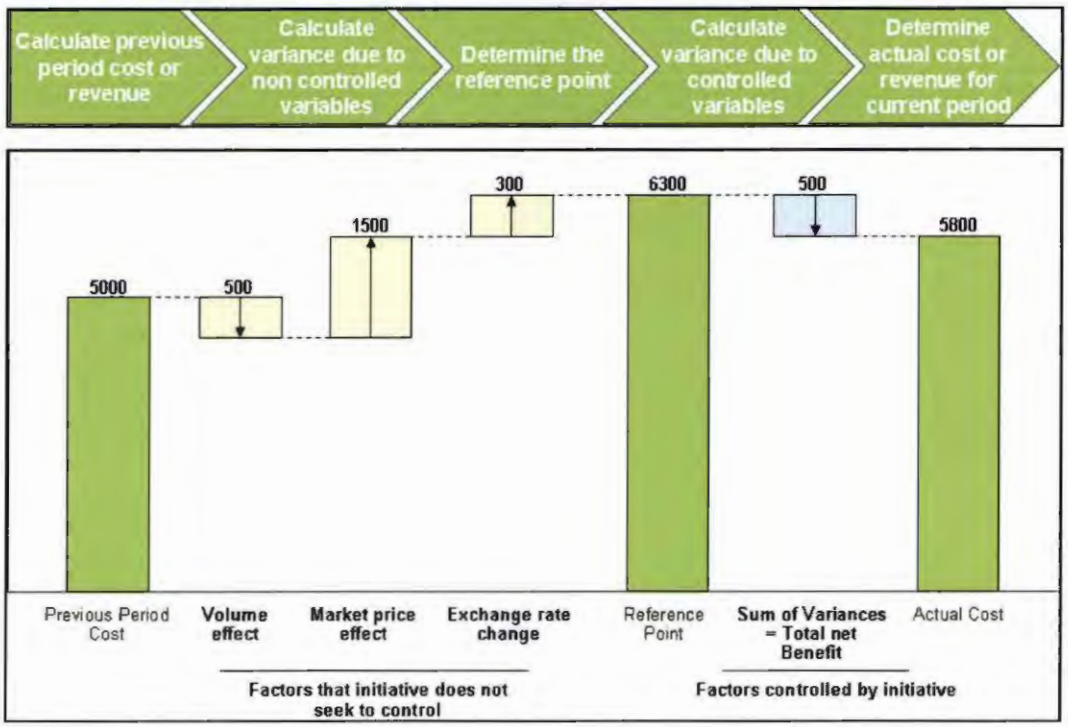
2 = current or forecast period.

*V.Q.U. is the amount of input consumed, such as tonnes of explosives or litres of diesel

**I.C.P. is the actual nominal price paid.

The above calculations are used to derive a reference point and then to determine the benefit of the chosen intervention. Diagram 2.8 below indicates the approached followed to derive a benefit. Benefits should be calculated with a clear and defined reference point. Anglo Platinum (2009:23) defines a reference point as: "The historical level of activity expressed in financial terms, adjusted for factors which are not influenced by the deliberate action, to determine the level of activity that would have been reached had no deliberate action occurred." Therefore, in principle, a reference point will typically be derived by determining the costs / revenue that a company would have ordinarily incurred / achieved had no deliberate action taken place. There might be a restricted number of allowable deviations to the above method in order to fairly reflect the reality of different operational circumstances and markets.

Diagram 2.8: Applying the Benefits Measurement Calculation Approach



(Source: Anglo Platinum, 2009:30)

2.3 SUMMARY

In companies such as Anglo Platinum or Barlow World, among others, VBM programmes have been credited with delivering exceptional value for shareholders.

VBM is about more than the headline performance measures. It can be concluded that VBM is an all-encompassing approach that has to with the redefining of goals, redesigned organisational structures and systems, rejuvenated strategic and operational processes that include recognition and rewards. In other words, it is about comprehensive organisational change.

Various metrics have been developed to measure the value creation process within the organisation. Discounted cash flow to the present value at the weighted average cost of capital lies at the heart of these metrics. VBM is not unique in coordinating the various business processes, but is unique in aligning those processes to create value for shareholders. VBM metrics are, most of the times, described as financial performance measures.

Metrics such as EVA, CFROI, MVA, SVA, and others are believed to reflect the true business economics better than the traditional accounting based measures. VBM metric are distinguished from accounting based measures by including all of the following:

- Cash flow analysis;
- Adjusting future cash flow with the time value of money; and
- The inclusion of cost of capital.

VBM tools are the research intervening variable while organisation performance is the dependent variable. The linkages among research variables were established, the research model drawn, ready to be tested using the quantitative methods to be described in the next chapter.

CHAPTER 3:
EMPIRICAL STUDY

3.1 INTRODUCTION

Maximising shareholder value should be management's primary objective. However, to maximise value managers need a tool for estimating the effects of alternative strategies. Amongst the tools at management's disposal is the economic profit calculation. Companies practice value based management (VBM) by systematically using the corporate valuation model to guide decisions. In recent times, VBM has become a popular topic in financial management. It is measured in various forms and numerous consulting firms have developed and popularised metrics designed to help corporations implement VBM systems. VBM involves managing the balance sheet as well as the income statement, and balancing long and short-term perspectives (Koller, 1994:87). VBM is seen by Koller (1994:87) as the only true measure of management actions to create wealth.

The main goal of this study is to investigate and determine whether investors can use operational performance and productivity measures as an indicator for share price movement of South African mining companies, listed on the Johannesburg Securities Exchange. With the recent drop in commodity prices experienced during the second half of 2008 and the first half of 2009, various mining companies have decided to reduce costs and preserve cash. This cash preservation has slowed down on capital expenditure and decreased production outputs, with the aim to improve productivity. How did this "cash preservation" affect productivity, and what effect did productivity have on VBM? How did this "cash preservation" add value to shareholders?

Productivity in the simplest form is the relationship of input and output variables. Input variables can be quantified as number of employees, operating assets and fixed assets, amongst others. While output variables can be quantified as turnover, earnings before interest and tax (EBIT), NOPAT and production units produced (ounces or tonnes of metal).

3.2 RESEARCH METHODOLOGY

A quantitative approach was followed in order to determine if investors can use productivity in order to predict share price movement. The following were used as indicators of share price movement: Total fixed assets per employee; NOPAT per employee; turnover per employee; working cost per employee; production unit per employee; working cost per production unit and NOPAT per production unit.

The quantitative research was done by making use of standardised historical annual reports and financial data obtained from McGregor BFA, to investigate the relationship between companies' productivity measures and share price.

3.2.1 Data collection

McGregor BFA's database (2009) was used to gather information of mining companies listed on the JSE. The database supplies real-time and historical fundamental information on South African listed companies, top unlisted South African companies, local and international economic data as well as international financial indicators and currency exchange data.

Only mining companies listed on the JSE were used. Diversified and holding mining companies were excluded from the research, as productivity measurements for these two types were not available. Exploration and development companies were also excluded, as these companies are not actively mining and productivity cannot be measured.

Various items within the annual reports, i.e.. income statement, balance sheet, cash flow statement and operations review, were selected as independent variables of the identified companies. The mining industry is largely driven by commodity prices, which varies, depending on market demand. To eliminate the effect of the commodity prices on the profitability ratios, other factors such as number of employees and production units were used to relate productivity.

The following productivity variables were selected as independent variables : Total fixed assets per employee; NOPAT per employee; turnover per employee; working cost per employee; production unit per employee; working cost per production unit and NOPAT per production unit to determine if these value creation measurements also have an influence on the share price of the selected companies.

The dependent variables selected were: the average share price (ASP); change in average share price (ΔASP); the year-end share price (YSP), and change in year-end share price (ΔYSP) of the companies. Data for ASP, ΔASP, YSP and ΔYPS were collected for the period 1998 to 2007.

3.2.2 Multiple linear regression

According to Levine *et al.* (2005:576), multiple linear regression can be used to predict the value of a dependent variable, with several explanatory variables. The multiple regression model, with k independent variables, is:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \ldots + \beta_k X_{ki} + \epsilon_i$$

Where:

β_0 = Y intercept,

β_1 = slope of Y_i with variable X_{1i} holding variables X_{2i}, X_{3i}, ..., X_{ki} constant,

β_2 = slope of Y_i with variable X_{2i} holding variables X_{1i}, X_{3i}, ..., X_{ki} constant,

β_3 = slope of Y_i with variable X_{3i} holding variables X_{1i}, X_{2i}, ..., X_{ki} constant,

β_k = slope of Y_i with variable X_{ki} holding variables X_{1i}, X_{2i}, X_{3i}, ..., X_{k-1} constant; and

ϵ_i = Random error in Y for observation *i*.

There are four key assumptions behind the multiple regression models that need to be checked as best as possible, according to Wisniewski (2002:356):

- A linear relationship exists between the dependent and independent variables. At an early stage of the process, scatter plots are produced to

determine if there is a linear relationship between dependent and independent variables.

- Regression errors have a constant variance. The errors are the difference between each actual dependent variable, and the dependent value predicted by the regression model. This can also be done by using scatter plots.
- The regression errors are independent of each other. This assumption implies that each error, or residual, is independent of the errors before it and the errors after it. If the errors are dependent, then autocorrelation exists, where the errors are strongly correlated with each other. The Durbin-Watson test can be used to determine if autocorrelation exists; and
- The independent variables are independent of each other. When independent variables are not independent of each other, multi-collinearity exists. To test for multi-collinearity, a correlation matrix can be calculated between all the independent variables being used in the model. The correlation matrix contains all the correlation coefficients of the independent variables.

One other important additional assumption made in the study was that the financial data of one year is not influenced by the financial data of any of the other years. For this reason, a multiple regression model was determined per year.

The coefficient of multiple determination ($r_{Y.12}^2$) represents the proportion of variation in the dependent variable (Y) that is explained by the set of explanatory variables selected (Levine *et al.*, 2005:580).

$$r^2 = \frac{\text{Regression of sum of squares}}{\text{Total sum of squares}} = \frac{SSR}{SST}$$

The coefficient of determination measures how well the regression equation fits the data and to what degree variation in the dependant variable (y) can be explained by variation in the independant variable (x). The closer the r^2 value is to 1, the better the fit. However, the poorer correlation exists, the further this r^2 value is from 1. Some statisticians, according to Levine *et al.* (2005:580), suggest that the adjusted r^2 value

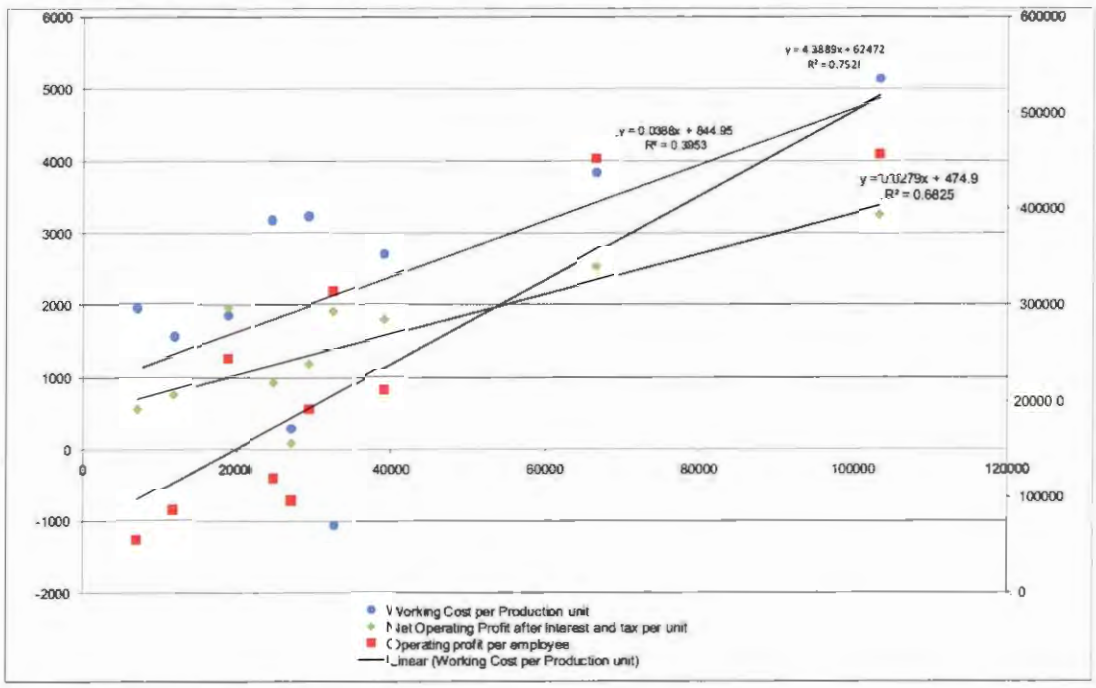
should be computed to reflect both the number of explanatory variables in the model and the sample size.

3.2.3 Data preparation

The data was prepared in accordance with the four assumptions listed in 3.2.2.

Assumption 1: A linear relationship between dependent and independent variables. Refer to Diagram 3.1 for a scatter plot between NOPAT per Unit, Cost per Unit, NOPAT per employee (independent variables) and Average Price per Share (dependent variable) that was produced to determine if a linear relationship exists between the dependent variable and one of the independent variables.

Diagram 3.1: Scatter plot – independent variables and ASP



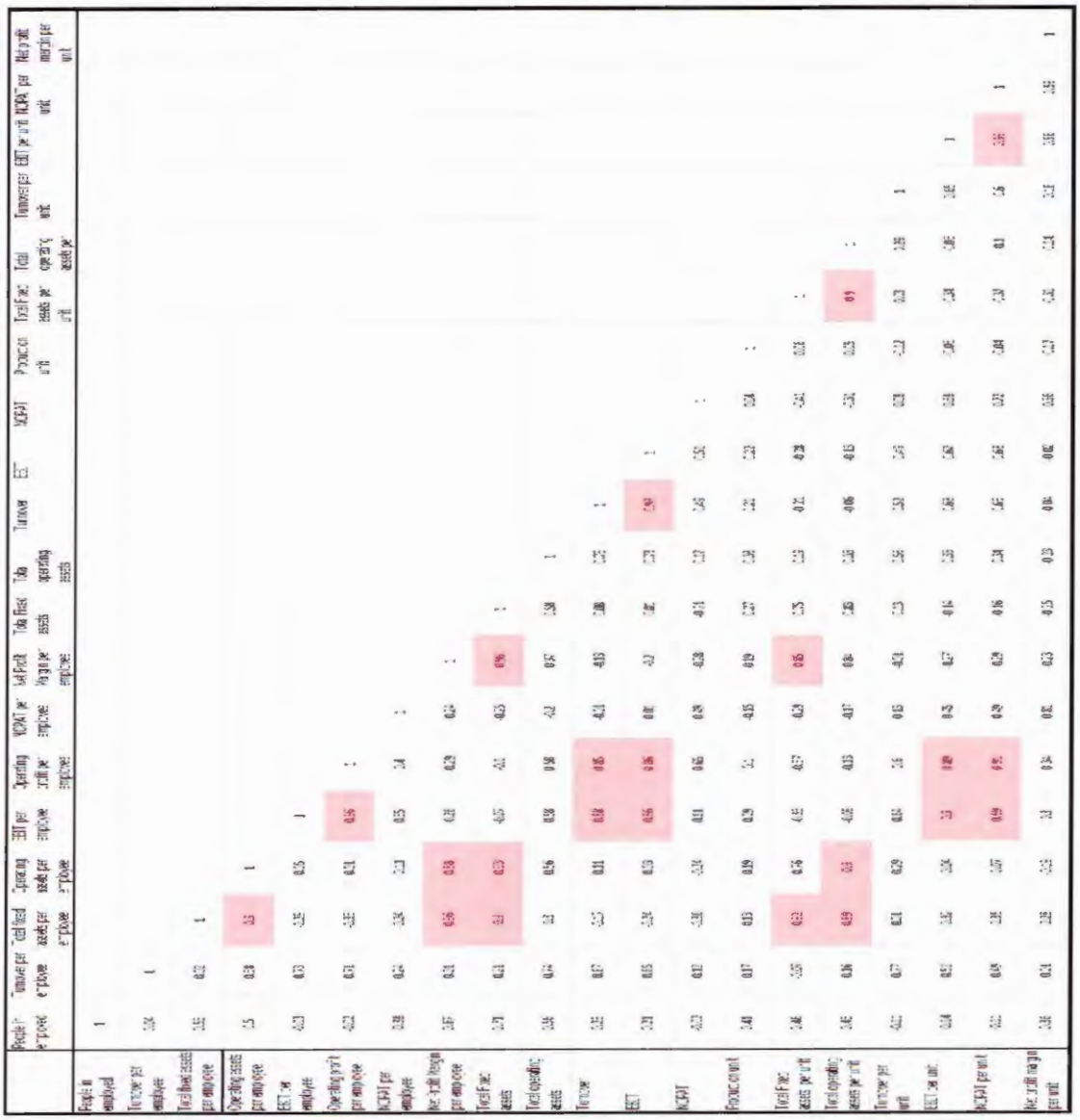
(Source: Own research)

Assumption 2: No correlation exists between independent variables.

The correlation matrix was evaluated to test for multi-collinearity. From this correlation matrix, the majority of the independent variables were eliminated from the multiple regression modelling. Refer to Diagram 3.2 for a correlation matrix calculated to test for

multi-collinearity. All variables with a correlation coefficient larger than 0.8 were considered to be dependent on each other, and was subsequently excluded from the data used to calculate the model. The values marked in red, indicates a correlation coefficient of 0.8 or higher.

Diagram 3.2: Correlation matrix – ASP: 1998-2007



(Source: Own research)

3.3 RESULTS

The multiple regression models were developed using the Statistical Consultation Services at the North-West University. The results of the multiple regressions are reported by making use of tables as indicated in Annexure 2. The results reported are variance inflationary factor (VIF), significance value (Sig.) and adjusted r^2.

3.3.1 Variance inflationary factor

The VIF was calculated for the independent variables. According to Levine *et al.* (2005:632), one method of measuring collinearity uses VIF for each dependent variable. As a general rule of thumb, amongst statisticians, VIF values larger than 5 should be eliminated, as strong correlations may exist where VIF values are larger than 5. Where the VIF of more than one variable, was larger than 5, the variable with the largest VIF was removed, and then the VIF was recalculated. The process of elimination of variables was redone, until all the variables had VIF values less than 5.

Please note in Table 3.1, VIF values for each regression models were calculated. The independent variables with VIF numbers above 5 was excluded. From the result one can see that the most occurring independent variables are production units per employee, working cost per production unit employee and NOPAT per production unit.

Table 3.1: VIF for all dependent variables utilised in the regression models

		Total fixed assets per employee	NOPAT per employee	Turnover per employee	Working cost per employee	Production units per employee	Working Cost per Production unit	NOPAT per unit
Average Share Price	2007	1				1	1	1
	2006	5				1	3	6
	2005		2			1	1	2
	2004		3	1		1	2	2
	2003		1		3	2	2	2
	2002		2		2		2	2
	2001	3	3		3		2	2
	2000	2			2	3	2	3
	1999	5	6	3	3	3	1	5
	1998	3	5	2		2	2	3
Change in Average Share Price	2007	1				1	1	1
	2006	5				1	3	6
	2005		2			1	1	2
	2004		3	1		1	2	2
	2003		4		3	5	5	5
	2002		2		2		2	2
	2001		3	5	4	4		4
	2000	2			2	3	2	3
	1999	5	6	3		3	1	5
	1998	3	5	2		2	2	3
Year End Share Price	2007	1				1	1	1
	2006	5				1	3	6
	2005		2			1	1	2
	2004		3	1		1	2	2
	2003		4		3	5	5	5
	2002		2		2		2	2
	2001		3	5	4	4		4
	2000	2			2	3	2	3
	1999	5	6	3		3	1	5
	1998	3	5	2		2	2	3
Change in year end Share Price	2007	1				1	1	1
	2006	5				1	3	6
	2005		2			1	1	2
	2004		3	1		1	2	2
	2003		4		3	5	5	5
	2002		2		2		2	2
	2001		3	5	4	4		4
	2000	2			2	3	2	3
	1999	5	6	3		3	1	5
	1998	3	5	2		2	2	3

(Source: Own research)

3.3.2 Standardised Beta (Std ß) values

The results of the standardised Beta values (Std ß) are displayed in Table 3.2, 3.3, 3.4 and 3.5.

3.3.3 Assess the overall fit of the regression model: Adjusted r^2

According to Levine *et al.* (2005:580), some statisticians suggest that the adjusted r^2 should be computed. This is especially necessary when one is comparing two or more regression models that predict the same dependent variable but have a different number of explanatory variables. The adjusted r^2 is an indication of how well the model equation fits the data. When the adjusted r^2 value is closer to 1, this indicates that the variation in the dependent variable is accounted for by the variation in independent variables. The results of the adjusted r^2 values are displayed in Table 3.2, 3.3, 3.4 and 3.5. From the results obtained, it is evident that not all the dependent variables can be explained by the regression models developed, because the r^2 value is not consistently above 0.8. It is noted, that the results indicate acceptable r^2 values for years 1999, 2000 and 2001.

In the results of all the dependant variables, the average adjusted r^2 values are 0.55. This implies that, 55 per cent of the variation in share price is accounted for in the variation of the independent values selected.

3.3.3 Assess the overall fit of the regression model: level of significance

The level of significance of 0.05 was used and critical values of the normal distribution were determined. This critical value was expressed as *p*-values. In Table 3.2, 3.3, 3.4 and 3.5, the "sig a" reflects the *p*-values to describe if there is an overall significant relationship between the dependent variables and independent variables. The "sig" reflects the p-value to describe if there is significant relationship between the dependent variable and each individual independent variable.

The highlighted values in red indicate the models and independent variables with p-values less than 0.05. From the results it is evident that in the years, 1999, 2000 and 2001, the dependent variables can be explained by the independent variables. In addition, the level of significance is not consistent in any of the models. None of the variables consistently have p-values less than 0.05.

Table 3.2: Change in Average Share Price Model outputs

Change in Average Share Price				Total fixed assets per employee	NOPAT per employee	Turnover per employee	Working cost per employee	Production units per employee	Working Cost per Production unit	NOPAT per unit
Year	Model Data									
2007	Sig a (P value)	0.84	Sig (P value)	0.99				0.37	0.72	0.95
	Adj r^2	-0.49	Std β	0.01				-0.44	-0.17	0.03
2006	Sig a (P value)	0.06	Sig (P value)	0.18				0.41	0.02	0.50
	Adj r^2	0.69	Std β	-0.72				0.84	0.30	-0.35
2005	Sig a (P value)	0.55	Sig (P value)		0.95			0.75	0.74	0.26
	Adj r^2	-0.07	Std β		0.07			0.14	0.14	0.62
2004	Sig a (P value)	0.51	Sig (P value)		0.72	0.40		0.88	0.24	0.73
	Adj r^2	0.04	Std β		0.22	0.41		0.06	-0.66	0.19
2003	Sig a (P value)	0.89	Sig (P value)		0.74		0.62	0.78	0.55	1.00
	Adj r^2	-0.80	Std β		0.35	-0.45		0.31	0.73	0.00
2002	Sig a (P value)	0.19	Sig (P value)		0.89		0.03		0.10	0.66
	Adj r^2	0.44	Std β		0.06		1.22		-0.86	-0.18
2001	Sig a (P value)	0.02	Sig (P value)		0.02	0.53	0.59	0.20		0.40
	Adj r^2	0.92	Std β		0.88	0.16	-0.12	0.34		-0.19
2000	Sig a (P value)	0.51	Sig (P value)	0.26			0.36	0.37	0.88	0.91
	Adj r^2	0.04	Std β	-0.74			-0.49	0.68	-0.07	0.07
1999	Sig a (P value)	0.01	Sig (P value)	1.00	0.10	0.02		0.01	0.01	0.31
	Adj r^2	0.98	Std β	0.00	0.36	-0.48		1.01	-0.59	-0.14
1998	Sig a (P value)	0.75	Sig (P value)	0.44	0.58	0.29		0.71	0.81	0.89
	Adj r^2	-0.46	Std β	0.68	0.62	0.85		-0.28	-0.18	-0.13

(Source: Own research)

The model data in Table 3.2 displays acceptable adjusted r^2 values and p values for the following years: 2006, 2001 and 1999. The following independent variables have a strong correlation with the model: NOPAT per employee; turnover per employee; production units per employee; working cost per employee and NOPAT per unit.

Table 3.3: Average Share Price model outputs

Average Share Price				Total fixed assets per employee	NOPAT per employee	Turnover per employee	Working cost per employee	Production units per employee	Working Cost per Production unit	NOPAT per unit
Year	Model Data									
2007	Sig a (P value)	0.40	Sig (P value)	0.71				0.45	0.85	0.63
	Adj r^2	-0.43	Std β	-0.19				0.36	-0.09	0.25
2006	Sig a (P value)	0.12	Sig (P value)	64.05				0.89	0.44	0.47
	Adj r^2	0.57	Std β	-0.68				0.89	0.33	-0.46
2005	Sig a (P value)	0.28	Sig (P value)		0.38			0.22	0.90	0.83
	Adj r^2	0.31	Std β		0.42			0.49	0.05	0.09
2004	Sig a (P value)	0.29	Sig (P value)		0.97	0.37		0.06	0.79	0.41
	Adj r^2	0.41	Std β		0.02	-0.35		0.84	0.10	0.38
2003	Sig a (P value)	0.34	Sig (P value)		0.45		0.65	0.29	1.00	0.47
	Adj r^2	0.19	Std β		0.27		0.23	0.51	0.00	0.27
2002	Sig a (P value)	0.07	Sig (P value)		0.20		0.02		0.09	0.57
	Adj r^2	0.67	Std β		0.44		1.19		-0.70	-0.18
2001	Sig a (P value)	0.14	Sig (P value)	0.05	0.09		0.15		0.75	0.51
	Adj r^2	0.48	Std β	0.98	0.87		-0.62		-0.11	0.24
2000	Sig a (P value)	0.00	Sig (P value)	0.66			0.32	0.13	0.49	0.94
	Adj r^2	0.36	Std β	-0.22			-0.44	1.10	-0.28	-0.04
1999	Sig a (P value)	0.14	Sig (P value)	0.87	0.47	0.26		0.05	0.08	0.72
	Adj r^2	0.80	Std β	0.06	-0.35	-0.39		1.13	-0.61	0.15
1998	Sig a (P value)	0.32	Sig (P value)	0.15	0.79	0.69		0.19	0.27	0.25
	Adj r^2	0.51	Std β	0.95	-0.17	-0.16		-0.72	0.57	0.73

(Source: Own research)

The model data in Table 3.3 displays acceptable adjusted r^2 values and p values for the following years: 2002 and 1999. The only independent variable that has good correlations on the model is working cost per employee.

Table 3.4: Change in year-end Share Price Model outputs

Change in Year End Share Price				Total fixed assets per employee	NOPAT per employee	Turnover per employee	Working cost per employee	Production units per employee	Working Cost per Production unit	NOPAT per unit
Year	Model Data									
2007	Sig a (P value)	0.63	Sig (P value)	0.81				0.21	0.74	0.94
	Adj r^2	-0.17	Std β	0.11				-0.58	-0.14	-0.03
2006	Sig a (P value)	0.10	Sig (P value)	0.18				0.66	0.03	0.50
	Adj r^2	0.61	Std β	-0.80				0.80	0.18	-0.40
2005	Sig a (P value)	0.15	Sig (P value)		0.33			0.18	0.22	0.37
	Adj r^2	0.51	Std β		0.40			0.46	0.40	0.33
2004	Sig a (P value)	0.73	Sig (P value)		0.77	0.37		0.39	0.35	0.75
	Adj r^2	-0.36	Std β		0.21	0.52		-0.44	-0.58	-0.21
2003	Sig a (P value)	0.75	Sig (P value)		1.00		0.25	0.31	0.54	0.77
	Adj r^2	-0.42	Std β		0.00		-1.04	1.11	0.66	0.30
2002	Sig a (P value)	0.74	Sig (P value)		0.52		0.42		0.36	0.93
	Adj r^2	-0.33	Std β		-0.41		0.53		-0.64	-0.06
2001	Sig a (P value)	0.12	Sig (P value)		0.58	0.16	0.28	0.04		0.17
	Adj r^2	0.70	Std β		-0.21	-0.79	0.52	1.38		0.67
2000	Sig a (P value)	0.50	Sig (P value)	0.99			0.55	0.82	0.80	0.52
	Adj r^2	0.06	Std β	-0.57			-0.68	0.25	0.28	0.73
1999	Sig a (P value)	0.14	Sig (P value)	0.92	0.49	0.49		0.09	0.12	0.88
	Adj r^2	0.80	Std β	-0.04	0.33	-0.21		0.87	-0.51	0.06
1998	Sig a (P value)	0.21	Sig (P value)	0.55	0.39	0.09		0.45	0.67	0.71
	Adj r^2	0.93	Std β	0.23	0.47	-0.82		-0.27	0.15	0.15

(Source: Own research)

The model data in Table 3.4 displays acceptable adjusted r^2 values and p values for the following years: 2006, 2001, 1999 and 1998. The following independent variables have a strong correlation on the model: production units per employee and working cost per unit.

Table 3.5: Year-end Share Price Model outputs

Year-end Share Price				Total fixed assets per employee	NOPAT per employee	Turnover per employee	Working cost per employee	Production units per employee	Working Cost per Production unit	NOPAT per unit
Year	Model Data									
2007	Sig a (P value)	0.83	Sig (P value)	0.70				0.49	0.81	0.66
	Adj r^2	-0.47	Std β	-0.20				0.33	-0.12	0.23
2006	Sig a (P value)	0.11	Sig (P value)	0.25				0.03	0.50	0.48
	Adj r^2	0.59	Std β	-0.69				0.87	0.28	-0.43
2005	Sig a (P value)	0.21	Sig (P value)		0.33			0.18	0.69	0.69
	Adj r^2	0.41	Std β		0.44			0.50	0.13	0.15
2004	Sig a (P value)	0.31	Sig (P value)		0.97	0.39		0.07	0.96	0.40
	Adj r^2	0.38	Std β		-0.02	-0.34		0.83	0.02	0.40
2003	Sig a (P value)	0.37	Sig (P value)		0.35		0.09	0.18	0.37	0.71
	Adj r^2	0.28	Std β		0.67		1.30	-1.14	-0.72	-0.28
2002	Sig a (P value)	0.14	Sig (P value)		0.36		0.03		0.13	0.69
	Adj r^2	0.53	Std β		0.36		1.17		-0.70	-0.15
2001	Sig a (P value)	0.08	Sig (P value)		0.27	0.55	0.40	0.07		0.43
	Adj r^2	0.78	Std β		0.39	-0.25	0.33	0.92		0.29
2000	Sig a (P value)	0.24	Sig (P value)	0.41			0.26	0.14	0.63	0.65
	Adj r^2	0.49	Std β	-0.37			-0.45	0.96	-0.17	0.20
1999	Sig a (P value)	0.05	Sig (P value)	0.77	0.61	0.14		0.02	0.03	0.55
	Adj r^2	0.93	Std β	0.07	-0.14	-0.34		1.11	-0.61	0.14
1998	Sig a (P value)	0.27	Sig (P value)	0.12	0.91	0.55		0.16	0.23	0.23
	Adj r^2	0.60	Std β	0.99	-0.07	-0.22		-0.74	0.58	0.72

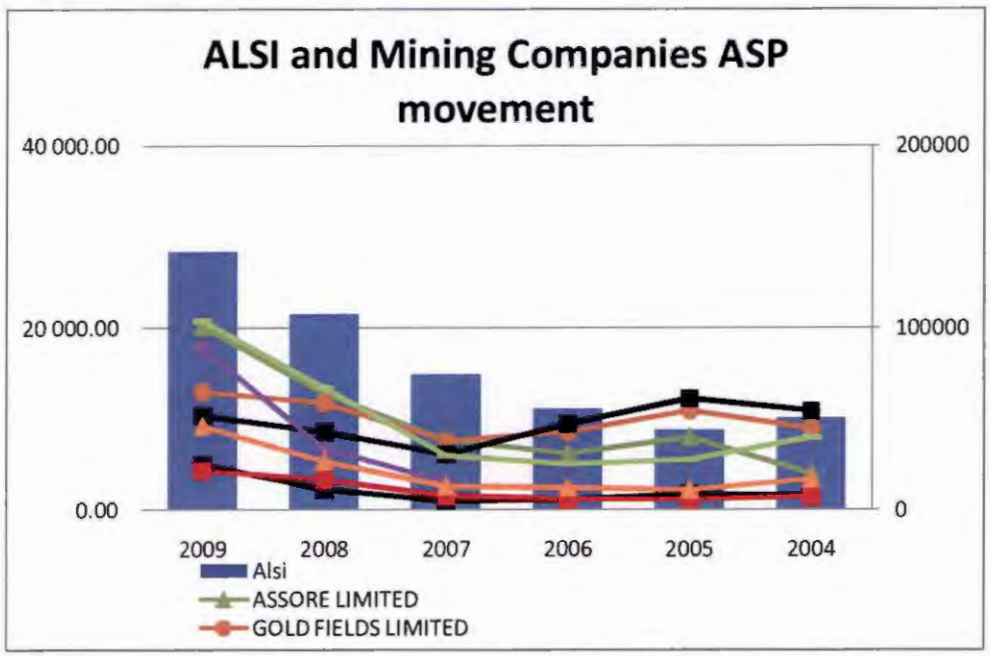
(Source: Own research)

The model data in Table 3.5 displays acceptable adjusted r^2 values and p values for the following years: 2001 and 1999. The following independent variables have a strong correlation on the model: working cost per employee; production units per employee and working cost per unit.

3.3.4 All Share Index of the JSE and share price movement

Monthly average data on the All Share Index (ALSI) on the JSE was obtained from year 2002 to 2009, and a yearly average was calculated. Diagram 3.3 reflects the trend of ALSI and ASP of the selected mining companies from 2002 and 2009. From diagram 3.3, it is evident that there is a trend between the ALSI and ASP of the selected mining companies.

Diagram 3.3: ALSI and ASP of selected mining companies



(Source: Own research)

An F-test was performed on each of the ASPs of the selected mining companies, in relation to the ALSI. An F-test is often used to test whether two independent populations have the same variability (Levine *et al.*, 2005:398). If $\alpha \leq 0.05$, then the conclusion can be drawn that the two populations (ASP and ALSI) have unequal variances. From the results displayed in Table 3.6, it is evident that the individual ASP movement of the selected mining companies have unequalled variability as the ALSI.

Table 3.6: Data of ALSI and ASP of selected mining companies

	Alsi	Transhex	ASSORE LIMITED	ANGLOGOLD ASHANTI LIMITED	DRDGOLD LIMITED	GOLD FIELDS LIMITED	HARMONY GOLD MINING COMPANY LIMITED	SIMMER AND JACK MINES LIMITED	ANGLO PLATINUM LIMITED	AQUARIUS PLATINUM LIMITED	IMPALA PLATINUM HOLDINGS LIMITED	LONMIN PLC	NORTHAM PLATINUM LIMITED
2009	22533												
2008	26962												
2007	28452	1307	20176	30602	668	12986	10379	405	103917	17801	21600	46022	4954
2006	21628	1186	12821	32051	946	11751	8554	143	67132	6707	16498	26619	2200
2005	14901	1580	7663	23644	956	7544	6128	47	29774	2988	7463	12871	910
2004	11115	2039	6206	23657	2014	8528	9433	24	25156		5888	12327	1085
2003	8846	2464	7993	26309	3164	10892	12262	27	27472		5575	10880	1658
2002	10141	1953	4005	54072	2967	8919	10877	18	39699		7148	16826	1475
average	17435	1755	9811	31723	1786	10103	9606	111	48858	9165	10695	20924	2047
std dev	8196	485	5850	11493	1095	2101	2121	152	31089	7706	6707	13556	1495
t-test		0.008	0.004	0.045	0.011	0.080	0.130	0.004	0.020	0.010	0.001	0.128	0.003
f-test		0.000	0.559	0.401	0.001	0.013	0.013	0.000	0.008	0.863	0.767	0.241	0.003

(Source: Own research)

3.4 SUMMARY

Maximising shareholder value should be management's primary objective. However, to maximise value, managers need a tool for estimating the effects of alternative strategies. In the recent economic climate, cash preservation has become key to maintain sustainability, with company management focusing on decreasing costs and efficiency improvements.

The focal point of the empirical study was to investigate and determine whether investors can use productivity as an indicator for share price movement of mining South African companies, listed on the Johannesburg Securities Exchange.

Productivity in the simplest form is the relationship of input and output variables. Input variables can be quantified as number of employees, operating assets and fixed assets, amongst others. While output variables can be quantified as turnover, EBIT, NOPAT and production units produced (ounces or tonnes of metal).

The results from the statistical analysis indicate that there is no conclusive relationship between the productivity measurements and the share price movement. However, a trend does exist between the overall market performance (expressed as the All Share Index) and share price movement.

CHAPTER 4:
CONCLUSIONS AND RECOMMENDATIONS

4.1 INTRODUCTION

In this chapter, the research findings are explored and interpreted in relation to the proposition of the research. The evaluation of the findings is correlated to the literature study. Through the evaluation, the research attempts to develop an understanding of whether investors can use VBM measurements to determine corporate performance, as well as share price movement.

The primary research goal of this study was to investigate and determine whether operational performance and productivity measures in the mining sector can be used by investors as an indicator for share price movement of mining companies, listed on the Johannesburg Securities Exchange.

The secondary research goals were:

- To investigate and determine how mining companies listed on the JSE performed against the All Share Index of the JSE; and
- The investigate and determine to what extent operational performance and productivity are responsible for share price movement.

4.2 RESULTS AND CONCLUSIONS OF PRIMARY GOAL

4.2.1 Results

The results from the multiple regression models were presented in tabular from, and contained the standardised beta (Std β), *p*-value (Sig.) and adjusted r^2 for each year. From the results obtained, there appears to be no consistent correlation between the productivity metrics and share price movement. It was found that certain of the

dependent variables' standardised beta are positive in one year and negative in the next year.

4.2.2 Conclusions

A company adds value when the present value of incremental net operating profit after tax (NOPAT) exceeds the incremental investment. Value based management (VBM) was developed as the only true measure of management actions to create value. With this in mind, can investors make use of VBM measurements to determine share prices?

The general response to a decline in earnings seems to be productivity improvements, because cost increases faster than revenue. So, productivity improvements will usually follow after the share price has already declined. Minassian (2009:1) and Esterhuizen (2009:1) seem to agree that share prices are basically driven by the anticipated profitability. Esterhuizen further states that, "What exactly productivity is or is not, is important as long as that number (NOPAT) increases. Once the profit starts slipping or even just stops growing, the share price will drop."

Based on the results from this study, productivity measures cannot be used as a metric to predict share price movement. Productivity efficiencies do have an effect on the overall performance of the company, thus a lagging indicator. Investors can use a company's price earnings (PE) ratio, but the PE ratio poses a problem in itself. The PE ratio is calculated by dividing the share price of a company by its earnings per share (EPS). To calculate the share price, the PE ratio should be multiplied with EPS. This is a problem, because it is assumed that PE ratio is constant, but it is not, because there are many factors influencing the PE ratio.

4.3 RESULTS AND CONCLUSIONS OF SUB OBJECTIVE ONE

4.3.1 Results

The adjusted r^2 of a multiple regression model is an indication of the variation in a dependent variable accounted for by the variation in independent variables. Thirty out of the forty observations reflect a significant r^2 value. The average adjusted r^2 values of

the models are less than 55 per cent. This implies that, on average, less than 55 per cent of the variation in a share price movement in a mining company is accounted for by the company's production performance.

4.3.2 Conclusions

A 55 per cent explanation of variation is fairly high, but there is another 45 per cent of the share price that is influenced by other factors. Other factors that influence share prices include the economy, company news, analysts' reports, technical influences and the risk profile of a country. El Mir and Seboui (2006:243) refer to a McKinsey survey that found that 15 per cent of investors consider corporate governance as more important than a firm's financial issues, such as profit performance or growth potential.

4.4 RESULTS AND CONCLUSIONS OF SUB OBJECTIVE TWO

4.4.1 Results

From the evaluation, there appears to be a trend between the all share index of the JSE and share price movements of the mining companies evaluated. The combined movement in share price of listed companies would constituent movement in the ALSI, however one would expect that companies that are better managed (or more productive) would grow or share prices would more beyond to what the market is growing or moving.

4.4.2 Conclusions

Commodity prices are cyclical and influence sales and therefore NOPAT. In 2008, analysts talked about a "super cycle", but it was just driven by demand from the East, countries like China and India, and largely supply from South Africa. Mining cycles drove the market growth and mining companies were thriving on upward cycles. South Africa's biggest export and foreign currency earner has always been natural resources, of which gold and platinum was and is the biggest contributors. Mining companies are

the biggest role-players on the JSE All Share Index based on market capitalisation. Therefore, the above explains the trend between market growth and individual company growth.

4.5 RECOMMENDATIONS

4.5.1 Investment criteria

VBM is seen as the only true measure of creating wealth for a company's shareholders. Can investors use VBM measurements for investment purposes, especially for share price movement in mining companies listed on the JSE? The evidence in this study indicates that, although there is no clear consistent productivity measure, within acceptable confidence limits, that has correlation on share price movement; varying productivity factors do have an impact on share price movements. It would therefore be prudent of investors to consider the levels of productivity in a mining company and to compare it to similar companies listed on the JSE. If investors only want to make short-term investments for high returns, then growth in NOPAT should be an adequate measure to use for predicting share price movement. If investors are, however, contemplating long-term investments, then productivity should be considered. It is beneficial to investors to understand what VBM is, and to understand management actions in terms of value creation. There are various other factors that investors should consider when deciding on which company to invest in.

Two of the major factors to consider for investment purposes are:

- The economic situation in a country. The political situation in a country, especially in an emerging market economy will also be a major factor to evaluate and consider, as these markets are usually in a process of transformation to an open market economy.
- High levels of government legislation in a particular industry. Government laws like Broad Based Black Economic Empowerment and the stringent health and safety acts can influence an investor's choice.
- Effect of administration prices on costs

- Organised Labour ect

4.5.2 Company perspective

The level of significance was high for the following productivity factors:

- Working cost per employee;
- Production units per employee; and
- Working cost per production unit.

It should be noted that the above factors' high significance was not consistent through all the regression models. However, productivity measures still remain critical in maximising value creation to shareholders.

4.6 SUGGESTIONS FOR FURTHER STUDIES

In the course of the current study, a number of areas were identified where further research could be beneficial:

VBM from a company perspective:
This study focused on VBM from an investor's perspective. Future studies could investigate how VBM is implemented and managed in South African companies. The findings should then be compared against actual company performance to determine if management actions do transpire into economic profits.

Commodity prices and share prices:
The effect of commodity prices on stock market returns and how it influences investment decisions could be investigated.

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