Research Topic:

DOES WORKING CAPITAL MANAGEMENT AFFECT PROFITABILITY IN COMPANIES LISTED ON THE JOHANNESBURG STOCK EXCHANGE.

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This thesis is not confidential. It may be used freely by the Graduate School of Business.

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I certify that this thesis is my own work and all references used are accurately reported in footnotes.

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ABSTRACT

Purpose – This paper is based on a research study which looks to investigate the relationship between working capital management and profitability of companies listed on the Johannesburg Stock Exchange Main board. Companies that operate in the service industry were excluded from the study population as they are not likely to use working capital management in the same way as companies in other industrial sectors.

Methodology – A total of 83 companies listed on the JSE main board were analysed in this study. Financial statements for the financial periods ended 2003, 2004, 2005, 2006 and 2007 were used to calculate inventory, debtors, creditors, return on (operating) assets and return on capital employed figures for the 83 companies. The 5 year averages for these companies were used in the regression between working capital management and profitability to determine if a significant relationship exists. The cash conversion cycle and the current ratio were used as measures of working capital management. The ROA and ROCE were used as profitability measures.

Findings – The regression results showed that there is a significant negative correlation between working capital management and profitability. It also was evident that inventory tends to influence profitability more than the other contributors to working capital.

Study significance – This paper contributes to the literature available on studies pertaining to the JSE on working capital management and profitability. It is designed to be fully representative of companies listed on the JSE Main board. The study is aimed at reaffirming the negative correlation between working capital management and profitability with significance testing at the 0.05 level of significance.

Keywords – Working capital management, profitability, inventory, debtors, creditors, return on assets, return on capital employed, financial statements, negative correlation, significance, causality, representative, relationship.

Paper type – Quantitative research paper.
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ABBREVIATIONS

ROA – RETURN ON OPERATION ASSETS

ROCE – RETURN ON CAPITAL EMPLOYED

CCC – CASH CONVERSION CYCLE

WCR – WORKING CAPITAL RATIO

EVA – ECONOMIC VALUE ADDED

JSE - JOHANNESBURG STOCK EXCHANGE

GAAP - GENERALLY ACCEPTED ACCOUNTING PRINCIPLES
CHAPTER ONE

1 INTRODUCTION

1.1 Research Area and Problem

Working Capital is a very important topic in the field of Corporate Finance. Managing working capital optimally to maximise profits is a huge problem area for finance executives and this research looks at whether this has a hugely significant bearing on the company’s overall profitability. On analysing the evidence, the results show that it does have an effect on profitability, and the research goes on to investigate how it affects profitability. Working capital has several aspects namely the cash conversion cycle, inventory, debtor collection days and creditor payment periods. Each of these aspects may have a different effect on the company’s profitability and they were analysed accordingly. Hall (2003) highlights that working capital management is one of the most significant drivers of shareholder value for companies listed on the Johannesburg Stock Exchange main board, with a strong emphasis being on industrial firms.

Research in the field of corporate finance has provided many breakthrough findings which have gone on to assist many corporations in their quest to increase shareholder wealth. Past research has concentrated mostly on areas that deal with the long term financing and investing decisions of the organisations. Most topics have been on business capital structures, dividend policies and matters concerning company valuations. Richards and Laughlin (1980) acknowledge that more research carried out has been on long term investment topics.

Most firms have a hugely significant amount of money invested in working capital. Foate (2003) mentions that up to 50% of many firms’ capital investments are in Working Capital. Reasons for this include the need to attract more customers by offering longer payment periods for credit purchases in the case of new and upcoming small firms. Longer credit payment terms provide an inexpensive source of credit for customers. Garcia-Teruel and Martinez-Solano (2007) found vendor financing to be more prominent in small to medium enterprises as it provides these firms with a cheaper source of financing than financial institutions. Other firms tend to pay their creditors a lot faster, within a period stipulated by
the supplier which in turn qualifies them for certain early settlement discounts. Most companies prefer to sell on cash rather than on credit but end up providing credit to attract more customers.

Inventory is also kept at significantly high levels to counter raw material price increases brought about by the volatile inflationary situation in times of macro-economic instability. The investments in current assets and the short term investments which mature within a year that companies make constitute the greatest number of items that populate the balance sheet. All these factors point towards companies using working capital management to enhance their profitability. This study looks to investigate the wisdom in using working capital management policies that are deemed effective in enhancing profitability. Bigger and well established companies have the option of extending debtor days, keeping additional inventory together with paying creditors a lot quicker. This is because they may have the necessary funding required to finance the resulting net investment in working capital. Small to medium enterprises on the other hand manage working capital depending on their profits and availability of cash to ensure liquidity. This research looks at the relatively bigger firms which are listed on the Johannesburg stock exchange’s main board.

1.2 Research Questions and Scope

This research paper looks at answering two questions which are associated with working capital management and profitability. The questions are as follows:

1.2.1 Does working capital management affect profitability in companies listed on the Johannesburg Stock Exchange? What correlation exists and how much of this relationship is significant?

1.2.2 Which of the contributors to working capital namely inventory levels, customer collection periods (debtor days) or supplier repayment periods (creditor days) has the greatest effect on profitability? How much significant are the differences in the levels of influence?

To help explain the relationships deducted from the information analysed, this research is based on the different aspects of working capital which can be effectively managed by
individual firms namely inventory, debtors and creditors. Aspects such as interest rates which affect working capital but are not controlled by the firm were not investigated in this study even though they may be mentioned and their effects highlighted.

1.3 Research Assumptions

This research is based on assumptions which suggest that the aggressiveness or conservativeness in managing working capital influences the profitability of the business and not the profitability of the company affecting how the chief financial officer manages working capital. This assumption is based on the findings of previous studies by Deloof (2003), Afza and Nazir (2007), Lazaridis and Tryfonidis (2006), Garcia-Teruel and Martinez-Solano (2007), Sen and Oruc (2009), Demirgunes and Samiloglu (2008), Mathuva (2009), Raheman and Nasr (2007), Uyar (2009), and Padachi (2006). They conducted studies on companies listed on stock markets in other emerging and emergent markets throughout the world.

The study is conducted on companies that managed to publish audited financial statements for each of the financial years ended 2003, 2004, 2005, 2006 and 2007. This is done to avoid doing analysis on information based on the periods when the world was experiencing some form of financial instability. A financial calamity in the form of the Dot Com bubble was experienced in the period from around 1997 up to the beginning of the new millennium in 2000. For this study the starting period for information collection is 2003 since the effects of the dot com bubble could have been influential in the results immediately after 2000. A financial crisis in the form of a credit crunch began in 2008 and lasted all the way up until the beginning of 2010 for businesses in South Africa and other emerging markets.

The second assumption made in this research study is that financial performance was more stable for most companies in periods after the dot com bubble and leading up to the world credit financial crisis thus the decision to use information from the trading periods ended 2003, 2004, 2005, 2006 and 2007. By allowing information from a less volatile period to be analysed, the trends which the data represents can be more accurately explained enabling the researcher to give more reasonable conclusions based on the findings.
The last assumption made is that, information used for this analysis is a true reflection of the overall performance of the company’s performance. Accounting information from the three main books of accounting namely the Balance Sheet, Cash Flow Statement and the Income Statement is used as the main source of data. Return on assets, return on capital employed, inventory, debtors, creditors and turnover are some of the parameters used for the different methods of analysis. Differences in the methods of accounting used by the different companies may result in differently calculated figures being reported by these companies in their financial statements. Because of the commonly used Generally Accepted Accounting Principles which govern the way accounting is done for companies listed on the Johannesburg Stock Exchange’s Main Board, the information from these different companies is assumed to be comparable despite the differences in accounting practices.

1.4 Research Ethics

The University of Cape Town ethical clearance form was completed and submitted together with a final version of the research proposal prior to commencement of this research. All information obtained in this research that is of a confidential nature will be treated as such and will not be made public. The Graduate School of Business will not allow any sensitive information to be published without the consent of the companies involved. All the information that will be used in this study is available to the public. All the companies whose financial data is used in this research are publicly traded on the Johannesburg Stock Exchange and this information is available to the public to allow for fair trading. The financial information on the companies which is used in this study was obtained from the Macgregor BFA website using the Blink Version 2 software and additional background information on the companies was obtained from the respective websites of the different companies. The companies’ financial information can therefore not be considered to be sensitive material. All the findings of this research which may be beneficial to the public will be made available to all those individuals and, or companies interested. This may be done by publishing the findings in the Journal of Management and Corporate Finance or in any other journal of a similar nature.
CHAPTER TWO

2 LITERATURE REVIEW

2.1 Discussion

2.1.1 Working Capital Management

2.1.1.1 Definition

Working capital management is a major component of corporate financial management. Corporate Finance can be divided into three main areas. These are capital structure, capital budgeting and working capital management according to Firer, Jordan, Ross and Westerfield (2008). Due to the highly competitive nature of business today, financial managers have to be inventive and innovative. Working capital management issues occupy most of the financial manager’s time reflecting the repetitive nature of investments. Financial managers and chief financial officers have to manage issues of working capital on a day to day basis to balance out the short term assets of the business with the short term liabilities. These have a bearing on the cash flow and profitability of the business. Padachi (2006) in his study of working capital management in Mauritian firms mentions the need for a balance between liquidity and profitability to maximize the value of the firm. The study also highlighted the relationship between meeting the firm’s short term obligations and the guaranteed profitability of any venture. Garcia-Teruel and Martinez-Solano (2007) mention the significance of using working capital management as a source of cheap financing which can in turn significantly improve your firm’s profitability by reducing the interests owed for cost of financing. Foate (2003) analysed the FTSE 350 companies and discovered that they save up to $35 billion using efficient working capital management options which end up as part of contribution to their bottom line as reduction in costs.

Padachi (2006) mentions the effects of working capital management on the firm’s liquidity. A balance should be struck between liquidity and profitability. Liquidity is defined as the firm’s ability to meet its short term financial obligations (Ahmed, 1998; Anand 2001). It is the ease with which the firm can raise cash to cover its short term liabilities. Deloof (2003) mentions that investments in short term assets made by companies and other short term investments
which mature within a year constitute the greatest number of items that populate most of the company’s balance sheet. The cash conversion cycle is determined by a firm’s purchasing, production, sales, and collection and payment decisions (Banos-Caballero, Garcia-Teruel and Martinez-Solano, 2009; Boisjoly (2009). Capital structure and budgeting is important for the long term decision making processes of the business. Working capital management is essential for the short term decisions which are equally as important and significant. In between the long term investing and capital structure decisions for the company are the day-to-day short term decisions of managing when to pay your creditors, debtor collection periods and choosing either a “make to order” or “make to stock” inventory control policy. These short term decisions are what constitute working capital management. By definition, working capital management is how the firm manages its everyday financial activities which help it to maintain its liquidity. This is according to Filbeck and Krueger (2005), Vishnani and Shah (2007), Weinraub and Visscher (1998), Gordon (2006), and Salawu (2006).

A study was conducted on Belgian firms to determine whether working capital management significantly affects profitability. The findings from this study confirm that a firm needs to have an optimum level of working capital management which will help it to maximise its profits. Working capital constitutes up to 40% of total assets on average for the Belgian firms studied in Deloof’s (2003) research. Investment into short term assets and the resources used which mature under a year represent a greater proportion of items on the balance sheet. This is a significant portion of the firms’ total assets. The findings from Deloof’s (2003) study contribute towards confirming the fact that working capital management is an important component of corporate financial management which significantly affects profitability as mentioned by Smith and Begemann (1997).

2.1.1.2 Components of Working Capital

The difference between a company’s current assets and its current liabilities is its working capital according to Boisjoly (2009). Current assets of the company include accounts receivable, inventory kept and the cash in hand bank balance. Current liabilities include accounts payable and short term non-interest bearing debt. Net working capital for the business is the increase or decrease in the difference between current assets and current
liabilities. Michalski (2008) mentions that a net investment in working capital is when there is an increase in inventory and accounts receivable that is higher than the resulting increase in accounts payable and non interest bearing debt acquired within a particular trading period. These figures are used in the calculation of the company’s cash conversion cycle. By definition the cash conversion cycle is the rate at which cash is circulated from payment for purchase of inputs to receipt of cash from customers for goods sold or services provided (Appuhami, 2008).

Kumar, Macklin and Nottestad (2007) conducted a study on a supply chain inventory structure. He discovered that a “Make to Stock” policy is a better alternative than a “Make to Order” policy. The reduction of production costs by eliminating extra runs results in the cost saving benefits outweighing the costs of maintenance and storage of the inventory. Firms can maximise their operating income through the make to stock policy. This in turn may contribute positively towards the firm’s profitability. There is no proven method which is stipulated to determine an optimum inventory level which will result in the lowest possible holding costs. A scenario analysis can be used to imitate different make to stock and make to order situations to try to come up with an ideal inventory level (Vishnani and Shah, 2007). By definition inventory consists of raw materials, work in progress and finished goods waiting to be sold or to be delivered to customers. Depending on the company’s inventory strategy, it can contribute majorly to the total currents assets on the balance sheet. Keeping inventory at an optimum level ensures availability of stock in times of unforeseen surges in demand and machine downtime. It also cushions the firm from price hikes of raw materials in periods of very high inflationary conditions. Wang (2002) points out that reducing inventory levels to extremely low levels may result in the firm losing increases in sales.

In order to meet the long term financial objectives of the firm, the short term financial objectives have to be consistently met. For these short term objectives to be met, an optimum level of working capital has to be determined and maintained by management. Overinvesting in working capital holds up money in inventory and accounts receivable which may result in reduced liquidity for the firm (Kieschnick, LaPlante and Moussawi, 2009). Reducing the debtor collection days shortens the cash conversion cycle thus increasing liquidity of the firm. This may boost profitability by freeing up more cash for funding new projects that are more
value adding, investments with bigger returns and acquisitions which may propel the company to a position of increased market dominance and profitability. Extending credit terms to customers and prolonging repayment periods may result in a significant increase in the firm’s total sales and a corresponding increase in profitability, provided expenses are kept as low as possible (Uyar, 2009). A greater investment in inventories has to be made and more trade credit granted to customers. The downside to such a strategy is the resultant prolonging of the cash conversion cycle. In addition, companies may be granted a discount for early debt settlement (Garcia-Teruel and Martinez-Solano (2007)). This helps to reduce the company involuntarily providing supplier financing. However, keeping a high investment in working capital also has an opportunity cost if firms forgo other more productive investments to maintain such high inventory and net investment in working capital levels. Garcia-Teruel and Martinez-Solano (2007) discovered that reducing working capital investment results in the firm realising higher profits. This confirms Deloof’s (2003) deduction when he analysed a sample of Belgian companies. The same was true earlier on when Shin and Soenen (1998) also concluded that aggressive policies of working capital management enhanced the profitability of US companies.

2.1.1.3 Cash Conversion Cycle

The cash conversion cycle is the rate at which cash is circulated from payment for purchased inputs to receipt of cash from customers for goods sold or services provided (Appuhami, 2008). The relationship between profitability and the cash conversion cycle was investigated by Lazaridis and Tryfonidis (2006) on companies listed on the Athens Stock Exchange. They discovered a statistically significant relationship between profitability and the cash conversion cycle. Three main components of working capital namely accounts payable, accounts receivable and inventory were used to best describe the cash conversion cycle. An optimum level of working capital should be determined and effective management principles put in place to maintain such a level (Deloof (2003). As illustrated in Figure 2.1 below, cash is used to finance purchase of raw materials, investment in trade creditors, wages, overhead expenses, work in progress financing and selling expenses of finished goods.
Filbeck, Krueger and Preece (2007) analysed working capital management results across industries and discovered that firms are able to reduce financing costs and increase funds available for expansion by minimizing funds held up in current assets as working capital. Companies are beginning to utilise the efficiency of six sigma methodologies in recent times in attempts to maximise working capital management. Oakland (2003) in his book on Total Quality Management defines six sigma methodologies as involving the use of lean techniques to produce quality goods right the first time just in time to deliver to the customer. This minimises inventory costs, volume of faulty goods returned and improves the cash conversion cycle. Inputs are also supplied and paid for just in time for them to be incorporated into the production processes.
Figure 2.2 The Working Capital Cycle

Figure 2.2 shows the different components of the working capital cycle. This cycle illustrates the three main types of inventory in the cycle as inventory of raw materials, inventory of work in progress and inventory of finished goods (Protopappa-Sieke and Seifert, 2009). The diagram summarises how inventory should be handled in the firm as part of working capital management. Efficiently managing inventory is important to a company because it is the least liquid component of current assets as it is always the last item convertible to cash. Dead money is cash tied up in inventory and cannot be used for any other more productive projects or investments. Despite this, the company cannot avoid the necessity of holding relatively reasonable levels of inventory throughout the working capital cycle. These statements clearly summarise why inventory needs to be efficiently managed and a balance struck between purchasing additional raw materials, storage of already purchased goods and lean inventory management principles like just in time manufacturing (Kieschnick et al., 2009).
2.1.1.4 Risk profile management

According to Afza and Nazir, (2007) working capital management is a lot more than just a simple and straightforward concept of ensuring that the organisation is able to fund its current assets and servicing current liabilities. It is a tool which can be used to minimize the company’s risk profile, consequently improving its overall performance. Lowering the firm’s risk profile reduces its required rate of return for equity financing. To illustrate this, a diagram of the investment frontier is included below. It shows that the required rate of return, R, on the y axis, is determined by the risk profile of the company, B, on the x axis. Weighted average cost of capital (WACC) is also determined by the firm’s risk profile. This is because in the event of the company taking up debt, its interest rate will be determined by its overall risk profile. The bond rating agencies also use the company’s risk profile to determine its overall bond rating together with other factors. This makes it all the more imperative that working capital management has to be understood in its entirety to find a balance between managing it aggressively and conservatively (Stewart, 1999; Stern, Shiely and Ross, 2001).

![Image of investment frontier showing risk profile and rate of return]

*Figure 2.3: Investment Frontier showing risk profile and rate of return.*

2.1.1.5 Working Capital Management

An aggressive working capital management policy involves maintaining significantly low levels of current assets and high levels of current liabilities. Because of the polarities involved with working capital, business success heavily depends on the financial manager’s ability to effectively manage receivables, inventory and payables to strike an optimum
balance which is in line with industry averages and company requirements (Visscher and Weinraub, 1998). In their comparison of aggressive and conservative working capital management policies, Afza and Nazir, (2007) investigated companies that are listed on the Karachi Stock Exchange. An aggressive investment policy involves a minimal investment in current assets whereas an aggressive financing policy involves a company maintaining high levels of current liabilities. Such low levels of investment in current assets and high levels of current liabilities are realised when accounts receivable and inventories are kept to a minimum whilst accounts payable are kept significantly high. A cross sectional regression analysis was performed on these companies’ working capital management policies against the firms’ Return on Assets, Return on Equity, risk profiles and Tobin’s Q. The Pakistani firms yielded negative returns when they followed aggressive working capital policies. This is attributable to the sizes of the firms that were investigated in this study and the industries in which they operate. The results contradicted Deloof’s (2003) and many other researchers’.

2.1.1.6 Working Capital Measures
As defined earlier on, working capital is the combination of current assets and current liabilities that are reported on the Balance Sheet of a company’s financial statements (Annuar, Rahim, Taufiq and Zariyawati, 2009). The net investment in working capital is the excess of current assets over the current liabilities. Current assets consist of inventory, debtors and cash in hand which is usually represented on the balance sheet as bank. Current assets as the name states can easily be converted to cash within that particular trading period without compromising their true value. These however need an investment to be financially covered by the company. Current liabilities are moneys owed by the company which are payable within the same financial year. The difference between these two is the net investment in working capital.

There are a few methods for measuring working capital. Some of these methods include using the current ratio which is a ratio between the current assets and the current liabilities. It is referred to as the liquidity ratio or working capital ratio in some books of finance (Atkinson & Kaplan; 1998). But then some books refer to the working capital ratio as the net investment in inventory and debtors less creditors divided by the turnover. Another way of measuring
working capital is by using the cash conversion cycle. This is somehow similar to working capital ratio in that its main components are inventory, debtors, creditors and the company’s turnover. The cash conversion cycle consists of inventory days added to debtor days and then subtracting the creditor days. Then there is the net trade cycle which is the total number of days it takes to fully complete one trade cycle. Alternatively, it can be defined as the number of trade cycles that can be completed in a single financial year (Firer et al., 2008). These are the different measures of working capital that can be used (Deloof, 2003). For this research study however, only three of these were used. These are the current ratio, working capital ratio and the cash conversion cycle. Since the net trade cycle is the working capital ratio converted to days by multiplying it by 365 (the number of days in the year), it will only be used to complement the other two measures of working capital.

2.1.2 Profitability

2.1.2.1 Definition

The profitability of a business is a function of how quickly it converts its inputs into bankable income, how well the running expenses that are incurred during the different company processes are managed and how much of this income trickles down to be incorporated into the company’s bottom line, eventually being collected as cash. That is to say, profitability encompasses generation of revenue, management of expenses and efficient generation of free cash flows (Anuar et al., 2009; Anand, 2001; Appuhami, 2008; Grablowsky, 1999; Janakiraman and Ramachandran, 2009). Vishnani and Shah (2007) define profitability as the rate of return on a company’s investments. Liquidity on the other hand is a measure of a company’s ability to meet its obligations and this is measured by the quick ratio (Padachi, 2006). Investments are financed through capital expenditure and a measure of their profitability is defined as their return on net capital employed.

Garcia-Teruel and Martinez-Solano (2007) in their study of the effects of working capital management on small to medium enterprises point out that working capital management involves a trade off between profitability and risk as decisions that increase profitability tend to also increase risk and vice versa. This was also illustrated by Smith (1980) when he measured the association between working capital and return on investment. By focusing on
decisions that increase investment in working capital, the company is also aiming to become more profitable. Sen and Oruc, (2009) in their study of companies on the Istanbul Stock Exchange used two models to explain the indicators relating the effects of working capital management to the firm’s return on total assets (ROA). ROA based on net operating assets is a direct measure of the company’s performance which reflects its operational profitability. In the first research question for this study, the return on net operating assets, cash conversion cycle, current ratio and return on net capital employed were used. For the second research question, accounts receivable period, accounts payable period and inventory period were used in the regression models to investigate their individual correlation with profitability indicated by return on net assets.

2.1.2.2 Profitability measures
Johnson and Soenen (2003) determines ten measures and pointers of success for a company as its book to market ratio, sustainable growth rate, profitability in the form of return on net operating assets, capital structure, size measured by total assets, liquidity, cash conversion cycle, advertising expenditure, research and development expenditures, and earnings volatility measured by the standard deviation of annual differences in earnings before interest and tax over a stipulated period of time. These also need to be taken into consideration when determining profitability for any company. Stewart (1999) suggests that Economic Value Added (EVA) is a better measure of a firm’s profitability. EVA gives a true reflection of actual value added taking into consideration all investments made. These can be investments in human capital through training and development of employees together with research and development of new products (Stern et al., 2001). A free cash flows method of measuring profitability can also be used. This method measures the net inflow of free cash flow and this is the key in determining the actual net market value of the company. Tsuji (2006) used the EVA of Japanese companies, earnings and cash flows in a study where he compared their effectiveness as a measure of profitability. For this study, two measures of profitability are used namely the return on net operating assets and return on net capital employed.
2.2 Conclusion

In the long run, working capital measures for firms within an industry change across time as technology improves, rate of innovation increases, competition steps up a notch and new efficient methods are adopted. In addition to these changes within the industry, unprecedented increases in interest rates are also likely to impact working capital management as debtors tighten their budgets thus lengthening collection periods in tougher times, whilst creditors demand shorter payment periods (Banos-Caballero et al., 2009). Figure 2.4 illustrates how working capital shortfall occurs, requiring additional investment to finance the periods when the company has already paid its creditors and expenses but still haven’t received payments from its customers. Depending on the quality of customers as shown in the illustration, these debtor repayment periods can be longer for customers who are going through a rough patch (Crum, Klingman and Tavis, 1983). Also the industry which one services, coupled with the interest rates at a particular time and debtor repayment periods, can result in doubling of the cash conversion cycle. Investment in materials and inventory can be reduced depending on the cash conversion cycle but wages, utilities and servicing of debt are paid on a more fixed time interval. These would have to be paid despite late settlement of debts by customers. Cash to service these will have to be sourced as an addition to net working capital for that particular period. In the event of no additional cash being available, debtors would have to be given incentives like discounts for early settlements to improve the cash flow of the company in the short term. In the medium term however, more stringent debtor screening processes may be necessary to avoid the negative impact on cash flow of late payments and bad debts not recovered. (Jose, Lancaster and Stevens, 1996; Toby, 2007).
A stronger working capital management strategy enhances flexibility and the competitive advantage of a firm. Business requires a healthy cash flow as this is the lifeblood of any firm. This is achieved by maintaining a strong working capital management policy. Smith and Begemann (1997) in their research on working capital and return on investment indicated that shareholders recognize the value of strong working capital management in terms of positive future prospects for the firm. Belt and Smith (1991) in their research on the comparison between working capital practises in Australia and the United States of America found out that those companies with a more formal working capital management policy were more profitable than those that had an informal one. This finding clearly underlines that actively managing working capital to an optimal level has a positive effect on profitability.

Working capital management is very important in making the organisation more profitable in both the short term and long term. An optimal level of working capital has to be determined and targeted enabling the organisation to maximise its profitability. However, the optimum level of working capital is not constant throughout the lifespan of the business as other
factors like bank lending rates play an integral part. Interest rates control the availability of money to both companies and individuals. If interest rates are too high, debtors collection days and creditor repayment days are usually higher than usual as companies avoid borrowing to cover day to day expenses. Bank lending rates are determined by the consumer price index which is not constant in any given year or period. Many studies which were performed in other countries determined that working capital management is a factor when it comes to a company’s profitability. The risk profile of the company is also affected by the way the firm manages its working capital. This study looks at the situation in South Africa among companies listed on the Johannesburg Stock Exchange’s Main Board.
CHAPTER THREE

3 RESEARCH METHODOLOGY

3.1 Research approach and strategy

Companies that are listed on the Johannesburg Stock Exchange are required to publish audited financial statements on a regular basis. Interim unaudited statements are released based on the results of six months into the trading financial year and the final audited results are released at year end. Audited financial statements are the source of all the information that will be used in this study. The study requires a comparison of the working capital management styles of the different companies and determining whether they are either aggressive or non-aggressive. The cash conversion cycle is one such measure of the aggressiveness or lack thereof of a working capital management strategy (Deloof, 2003). It gives a more combined illustration of the inventory days, debtor collection days and creditor payment periods. Working capital management is a function of how these three are effectively managed on a daily basis. An increased cash conversion cycle indicates a conservative working capital management whereas a lower cycle indicates aggressive working capital management. The formula for the cash conversion cycle is given as:

\[
\text{Inventory Days} + \text{Receivable Days} - \text{Payable Days}
\]

Similarly, the Net Trade Cycle can be used as a measure of working capital management. Its formula is quite similar to that of working capital ratio and it is as follows:

\[
\text{Net Trade Cycle} = \frac{(\text{Inventory} + \text{Receivables} - \text{Payables}) \times 365}{\text{Turnover}}
\]

A working capital ratio analysis will also be conducted to aid in the determination of the level of working capital management. For the ratio, the lower the ratio the more aggressive the working capital management and the higher the ratio the more conservative the management of working capital is. The formula for the working capital ratio used in this study is given as:

\[
\frac{(\text{Inventory} + \text{Receivables} - \text{Payables})}{\text{Turnover}}
\]
Working capital management can also be measured using the current ratio. This is also called the working capital ratio in some of the literature reference in this study. But for this particular study, it will be rightfully referred to as the current ratio to avoid any confusion with the above mentioned working capital ratio which has a different formula. The current ratio gives a proportion of current assets to current liabilities. An increased current ratio indicates a more conservative approach to working capital management whereas a decreased current ratio indicates a more aggressive approach to working capital management. The formula for the current ratio is given as:

\[
    \text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}
\]

The second aspect of the study is that of profitability. Measuring profitability can be done in many different ways. This is mainly because profitability is a very relative term depending also on the size of the company being analysed. Seeing that no two companies are of exactly the same size on the Johannesburg Stock Exchange, a standard way of measuring profitability has to be used. One such method is indexing the profitability of each company to make the results more comparable. Examples of measuring profitability include using a profitability index, measuring the economic value added, using the net profit margins as percentages of total sales, using the returns on assets and the returns on capital employed figures. For this research, two profitability measures were used. These are return on assets (ROA) and return on capital employed (ROCE). ROA is given by the formula:

\[
    ROA = \frac{\text{Net Operating Profit}}{\text{Net Operating Assets}}
\]

Also as part of profitability measurement, the ROCE is going to be used. The formula for this is given as:

\[
    \text{ROCE} = \frac{\text{Net Profit}}{\text{Capital Employed}}
\]

The research is conducted on companies that are listed on the Johannesburg Stock Exchange Main Board. Not all the companies listed will be used in this research however. This research is excluding companies that provide services like banks, insurance companies and other service providers (Deloof, 2003). The reason for this is that they do not utilise all the different
components of working capital. Banks do not have any inventory whatsoever. They are in the business of accumulating debtors and creditors. Insurance companies are similar to banks but they are in the business of theoretically borrowing money which they may or may not pay back. Companies that mainly deal in cash transactions like groceries retailers namely Pick ‘n Pay, Spar and Shoprite Checkers will also be excluded from this research. Inventory levels for Pick n’ Pay are expected to be high with no debtors at all. The inventory days would be very low as they have a very short trade cycle. Payables’ figures are also expected to be high and this will give them a very negative cash conversion cycle. All the above mentioned industries have been excluded to try and make analysis a lot easier and more explainable.

3.2 Research design, data collection methods and research instruments

This research study is designed to be of a quantitative nature. Information was collected from a list of companies that were listed on the Johannesburg Stock Exchange for at least the financial trading periods ended 2003, 2004, 2005, 2006, and 2007. In each financial trading period, figures for turnover, inventory, debtors, creditors, operating profit, operating assets, net profit, capital employed, current assets and current liabilities were extrapolated using the Blink Version 2 software from the Macgregor BFA website. Some of the ratios like ROA, ROCE and current ratio were extrapolated as is from the Macgregor BFA website whereas some like the working capital ratio were calculated using the information obtained. In a few cases where information from the Macgregor BFA website was not very clear, clarification was made using either the company in question’s website or the Johannesburg Stock Exchange website.

The information obtained was analysed using Microsoft Excel, Stata Statistical software and Prism Graph Pad version 5 programs for statistical analysis. The analyses done using the different software include describing data numerical measures, descriptive statistics measure of dispersion, test for normality, histogram representation, scatter plot representation, analysis of variance, t-test for hypothesis testing, p-value determination for confidence interval testing, and Pearson’s correlation and regression analysis. The results are to be used to explain the relationship between working capital and the firm’s profitability. No additional information was obtained by any form of interviewing be it verbal or by electronic
communication. This is not a contact study and no surveys of any sort were used to complement the financial information. The sample that was used is of all the companies from the JSE Main Board that meet the inclusion criteria used in the study. This was done to ensure that the results obtained from this study are of statistical significance and can be used to explain trends about working capital and profitability on the JSE.

3.3 Sampling and Research criteria

The sample that is used in this study is based on a database provided by the Johannesburg Stock Exchange (JSE) of all the companies listed on the Main Board and the Alt X Board. The study looks at companies that are listed on the Main Board. This is because the Main Board has companies that have all the information relevant for this study making them easier to analyse. These companies are also sizeable with turnover of at least R20 million per annum. Information on these companies is available on the Johannesburg Stock Exchange’s website which is www.jse.co.za/listedcompanies and databases available from the GSB library namely McGregor, I-net Bridge, Data Stream and Reuters. Information on company backgrounds was obtained from the JSE website whereas financial data was obtained from the McGregor BFA website using the Blink Version 2 software application.

Not all the companies listed on the JSE’s Main Board were used in the data analysis of this study. A population of companies that meet a set of inclusion characteristics will be used. This population is designed to be a true representation of all the companies listed on the JSE’s Main Board. Several inclusion and exclusion criteria exist however. The first inclusion criteria stipulates that only companies that have been listed on the JSE from the financial year ended 2000 will be included in this study. This is because analysis will be performed on financial statements from the financial periods ended 2003, 2004, 2005, 2006 and 2007. All companies should have published fully audited statements for these periods. The companies also need to have been in public trading for at least 2 years prior to the financial statements for the financial period ended 2003. This is to allow for the company operations to have stabilised after an initial public offering. Companies need to also have been consistently listed and publicly trading over the financial periods ended 2003, 2004, 2005, 2006 and 2007.
Audited financial statements need to be available for these periods for analysis for the companies to be included in the sample of JSE Main Board listed companies to be analysed.

Secondly, the main exclusion criteria is that companies that are in the energy, water, banking, finance, insurance, business services, renting/letting out properties and other service industries will be excluded from this sample due to the nature of their business. Information from these companies will not provide ample evidence of working capital management (Deloof, 2003; Lazaridis and Tryfonidis, 2006). For instance, companies in these industries do not have any inventory figures on their financial statements. These service industry companies do not utilise any form of working capital management to enhance their profitability in any case. In addition companies that provide retail services for cash only, like Pick n Pay, Spar and Shoprite Checkers, will also be excluded from this study. This is due to the nature of their operations which allows them to receive cash on the spot for all their sales but may pay their creditors up to 60 days after delivery of goods. In such an instance, their inventory days are actually hugely negative and will make analysis complicated with the advent of extreme outliers. Also in some instances, these companies do not actually own inventory but instead may rent out space to the different producers of consumer goods like Tiger Brands and Unilever. This also adds to the complication in the analysis of working capital for these firms.

Lastly, the total number of companies available for analysis that meet the inclusion criteria were a lot less than initially intended. Less than a hundred companies met the inclusion criteria and they are listed in the appendix to this report. As the total number of companies was less than hundred, a decision was made to include all the companies in the study analysis to try to ensure that the population was truly representative of all the companies that are listed on the JSE.
CHAPTER FOUR

4 RESEARCH FINDINGS, ANALYSIS AND DISCUSSION

4.1. Data analysis methods

The data obtained in this research was analysed using Microsoft Excel, Stata statistical analysis program and Prism 5 Graph Pad statistical analysis computer software. These programs were used to compute measures of dispersion, correlation and regression analysis, hypothesis testing, analysis of variance and testing for significance of the results obtained. Graphs to represent the results were plotted using Microsoft Excel and Prism 5 Graph Pad statistical analysis software. The different graphs plotted are the histogram and scatter plots for the illustration of normality and the regression line of best fit to illustrate correlation. The table below shows the formulae used in the different calculations made for the determinants of working capital and profitability, using information from audited financial statements.

Table 4.1: Formulae used in determination of Working Capital and profitability

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>FORMULA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory days</td>
<td>(Inventories X 365)/Turnover</td>
</tr>
<tr>
<td>Accounts receivable days</td>
<td>(Accounts Receivable X 365)/Turnover</td>
</tr>
<tr>
<td>Accounts payable days</td>
<td>(Accounts Payable X 365)/Turnover</td>
</tr>
<tr>
<td>Cash conversion cycle</td>
<td>Inventory days + Accounts Receivable - Accounts Payable</td>
</tr>
<tr>
<td>Economic Value Added</td>
<td>(Rate of Return – WACC) X Capital Employed</td>
</tr>
<tr>
<td>Return on Assets</td>
<td>Net Operating Profit / Total Assets</td>
</tr>
<tr>
<td>Working Capital Ratio</td>
<td>(Inventory + Debtors – Creditors) / Turnover</td>
</tr>
<tr>
<td>Current Ratio</td>
<td>Current Assets / Current Liabilities</td>
</tr>
<tr>
<td>Return on Capital Employed</td>
<td>Net Operating Profit/Capital Employed</td>
</tr>
<tr>
<td>Net Trade Cycle</td>
<td>(Accounts Receivable + Inventory – Accounts payable) X 365/Turnover</td>
</tr>
</tbody>
</table>
4.2. Research Findings

4.2.1 Questions and Testable Hypotheses

Research Question 1

- Does Working Capital Management affect profitability in companies listed on the Johannesburg Stock Exchange? What correlation exists and how much of this relationship is significant?

Hypothesis

This hypothesis is going to look at the relationship between the most commonly used measures of working capital which are the current ratio and cash conversion cycle, and the most significant measures of profitability which are the return on assets and the return on capital employed. It has been previously determined that there is a negative correlation between working capital (represented by current ratio and cash conversion cycle) and profitability (shown by return on assets and return on capital employed) with the latter being the dependant variable. The formulae for finding the values for the two are indicated in Section 4.1 and indicated in Table 4.1 of this paper. The null hypothesis and the alternative hypothesis are indicated below and will be investigated at the 0.05, level of significance.

H₀ - The correlation between working capital management (current ratio and cash conversion cycle) and profitability (return on assets and return on capital employed) is not different from zero.

H₁ – The correlation between working capital management (current ratio and cash conversion cycle) and profitability (return on assets and return on capital employed) is different from zero.
Research Question 2

- Which of the components to working capital namely inventory levels, customer collection periods (debtor days) or supplier repayment periods (creditor days) has the most significant effect on profitability? How much significant is the differences in the levels of influence?

Hypothesis

A more significant profitability measure between ROA and ROCE should be used in the regression with each of the three components of working capital namely inventory, debtor and creditor days to determine which one is more influential in determining the profitability of an organisation. The correlation between the Return on Assets of the companies being analysed is regressed against each of the different components of working capital. Return on Assets is used in this instance as the most significant measure of profitability and is the dependant variable. Inventory, debtors and creditor days are used as the measurement parameters and the method of calculation is indicated in earlier sections of this paper. The null hypothesis and alternate hypothesis are indicated below at the 0.05 level of significance.

$H_0$ – The correlation between profitability and each of the components of working capital (inventory, debtors and creditors) is not significantly different.

$H_1$ - The correlation between profitability and each of the components of working capital (inventory, debtors and creditors) is significantly different.

4.2.2 Data Exploration and Presentation

The data collected needs to adhere to certain requirements for the results to be deemed significant. All the data for each variable used in the correlation and regression analysis should be significantly normally distributed about its mean (Keller, 2008; Lind, Marchal and Wathen, 2008). To show that the data is significantly normally distributed, a histogram of each of the data sets collected was plotted and a normal distribution curve was added to the histograms to show if the data is normally distributed. The data sets plotted include the
current ratio, working capital ratio, cash conversion cycle, inventory days, debtor days, creditor days, return on assets and return on capital employed. The cash conversion cycle is calculated by multiplying working capital ratio by 365. Information was collected over the period from the financial years ended 2003 up to 2007. The data for the five years was then averaged per company included in the study population and the average used in the analysis. This was done to factor out any anomalies that could have occurred in a single year resulting in data that is not truly representative.

The results are illustrated in histograms below and normal distribution curves added to test for normality. The data for current ratios is roughly normally distributed with only one outlier. The extreme outlier is responsible for the slightly positively skewed distribution of data. An acceptable degree of normality is exhibited which means that the data is truly representative. The same applies for ROA data and the cash conversion cycle data. ROA is negatively skewed which is different from all the other data sets. It is a measure of profitability and the presence of some few companies incurring very huge losses during this period can be an explanation for this. Average return on assets is around 10% but a sizeable number of companies are between 11% and 22%. This is expected of companies listed on the Main Board considering that the results are from a period characterised by profitability for most of the companies. There are no negative inventory days’ figures but the positively skewed distribution shows that the study population contains some companies that keep inventory for a lot longer.

![Current Ratio Histogram](image-url)

**Figure 4.1: Histogram of the Current Ratios**
Figure 4.2: Histogram for Return on Assets

Figure 4.3: Histogram of the Cash Conversion Cycle

Figure 4.4: Histogram of the Inventory days
Mining and other minerals companies keep a lot of inventory especially the diamond and other precious minerals companies. These could be the ones that are causing the inventory days to be positively skewed with a few having over 200 days of inventory at a time. It is important to note that every data set has an extreme outlier. For each variable the data is from a different company in a different sector showing that the extreme figures are not sector specific. In addition to this, the companies with extremely high cash conversion cycles will also tend to have a very negative ROA. Excluding these companies with outlying values would drastically reduce the size of the study population resulting in the significance of the study being compromised. The criteria of excluding some companies would result in the dilution of the specific characteristics of the companies listed on the Main Board. There are extremes in both ends of the datasets and these should complement each other resulting in a more representative population. These extreme outliers influence the slope of the equation to a greater extent than they do the correlation coefficient and the p-value for significance testing. It is therefore decided to include all the companies that meet the inclusion criteria despite them having an extreme outlier for one of the variables.

The population selected for this study includes companies from at least ten different industry sectors in South Africa. This huge variety in sectors resulted in at least one outlier being very evident for each one of the different data sets. Some of the outliers where outside the $\pm 3$ standard deviations from the population mean stipulated as the cut off for data to be included in some of the literature. Tabachnick and Fidell (1989) mention that to avoid the distorting effect of extreme outliers, data that is outside $\pm 3$ standard deviations from the population mean should be excluded from the sample to be analysed. For this study however, the removal of some outliers would have resulted in a population that is not truly representative of the different sectors of the companies on the JSE Main Board. This would have diluted the significant differences you get from one sector to the other when analysing working capital management of listed companies.

Jordaan, Smit and Hamman (1994) discovered that the financial ratios of South African firms were not normally distributed. This was not the case for this study however as the ROA, ROCE, working capital ratio and current ratio used in this study showed significant levels of normality despite an outlier or two for each data set.
4.3 Research Analysis and Results Presentation

4.3.1 Descriptive Statistics

The selection of the different measurement parameters for both working capital and profitability was based on the findings from other studies done in earlier research on the same topic. Return on (operating) assets is the most commonly used measure of profitability as it gives a more accurate reflection of the firm’s profitability based on the returns on operating assets. Czyzewski and Hicks (1992) indicate that ROA is a good measure of profitability as it gives an indication of the cash flow of the business. Return on capital employed was also used as a complementary measure of profitability and it showed a very significant negative correlation with working capital in earlier studies. The cash conversion cycle and the current ratio are the most commonly used measures of working capital management. Deloof et al. (2003) used the cash conversion cycle as a measure of working capital management. In this study the working capital ratio is more of a control statistic of the cash conversion cycle. The cash conversion cycle is used with the current ratio as the main measures of working capital management. The working capital ratio and the cash conversion cycle have a similar regression line when regressed against both ROA and ROCE.

Table 4.2 Summary of descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>CURRENT RATIO</th>
<th>ROA</th>
<th>CCC</th>
<th>INVENTORY DAYS</th>
<th>DEBTOR DAYS</th>
<th>CREDITOR DAYS</th>
<th>ROCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEAN</td>
<td>1.71</td>
<td>10.14</td>
<td>56.26</td>
<td>76.11</td>
<td>66.20</td>
<td>86.04</td>
<td>10.46</td>
</tr>
<tr>
<td>SD</td>
<td>1.32</td>
<td>18.77</td>
<td>118.08</td>
<td>179.69</td>
<td>108.33</td>
<td>194.31</td>
<td>34.12</td>
</tr>
<tr>
<td>MAX</td>
<td>11.88</td>
<td>41.75</td>
<td>941.93</td>
<td>1613.63</td>
<td>673.59</td>
<td>1334.00</td>
<td>237.03</td>
</tr>
<tr>
<td>MIN</td>
<td>0.22</td>
<td>-96.68</td>
<td>-261.10</td>
<td>0.00</td>
<td>5.17</td>
<td>12.75</td>
<td>-106.43</td>
</tr>
<tr>
<td>RANGE</td>
<td>11.67</td>
<td>138.43</td>
<td>1203.03</td>
<td>1613.63</td>
<td>668.42</td>
<td>1321.26</td>
<td>343.46</td>
</tr>
<tr>
<td>SIZE</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
</tr>
<tr>
<td>SKEW</td>
<td>5.83</td>
<td>-2.65</td>
<td>4.98</td>
<td>7.93</td>
<td>4.93</td>
<td>5.33</td>
<td>2.80</td>
</tr>
</tbody>
</table>
The above table shows a summary of the measures of dispersion for all the data sets used in this research analysis. The inventory and creditor days have got the most dispersed data signified by a high standard deviation. The differences in sector properties results in extremes in the decisions pertaining to how much inventory is kept and how much time it takes to collect from debtors. Precious minerals mining companies would have a higher inventory level due to the economies of scale. Manufacturing companies would have shorter inventory days as they would implement a make to order policy. The current ratio has a significantly low standard deviation as most listed companies would want to balance their current assets with their current liabilities to ensure that they remain liquid. For the profitability measures, the ROA has a lower standard deviation than the ROCE. ROA trully reflects the company’s operational profitability whereas the ROCE can include income from other outside investments (Firer et al., 2008). Most of the data sets have outliers that are more than 3 standard deviations from the mean and a median not equal to the mean. This shows that the data is from a diverse population of companies on the JSE with significant representation from the different sectors.

Another distortion for the data population used in this study would be the sector effect of working capital management. Hawanini, Veallet and Vora (1986); Jose, Lancaster and Stevens (1996) and Hoffman (1997) mention that there is a significant difference in how working capital is managed across the different sectors. This brings about the extreme differences in the working capital figures with some sectors having extremely aggressive working capital management whereas some will have extremely conservative working capital management policies. Smith (1998) however found that there is no significant sector effect of the relationship between working capital management and profitability. This study does not take into consideration the sector effect of the relationship between working capital management and profitability. This is based on Smith’s (1998) findings which are more recent than the other findings which suggest that the sector effect on the relationship between working capital management and profitability should not be given a lot of considerations.
4.3.2 Regression Analysis

4.3.2.1 Hypothesis One

Every regression involves a dependant and an independent variable. The independent variable is represented on the x axis whereas the dependent variable is represented on the y axis. The independent variable can also be referred to as the determinant. It determines the value of y based on the gradient of the slope and the y intercept. In this study, working capital is the determinant on the x axis. This is based on findings from previous studies by Deloof (2003), Afza and Nazir (2007), Lazaridis and Tryfonidis (2006) and Garcia-Teruel and Martinez-Solano (2007). The studies being referenced and other literature indicate which of the two variables is dependant and which one is the independent variable. The Granger causality test was not performed as literature was used to determine causality. This test measures the cause and effect of one variable on the other by carrying out a series of regressions interchanging the variables to see which combination is more significant (Granger, 1969; Gujarati, 2003). Some research has been conducted in South Africa on the effects of working capital management on profitability. Hoffman (1997) conducted a research on South African firms which showed that their working capital management is significantly influenced by the nature of the company’s operations. This study suggested that working capital management could be the dependant variable in the case of South African companies.
Table 4.3: Regression results for hypothesis one

<table>
<thead>
<tr>
<th>Y:X</th>
<th>MULTIPLE R</th>
<th>R-SQUARE</th>
<th>P-VALUE</th>
<th>REGRESSION EQUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURRENT RATIO:ROA</td>
<td>0.393202434</td>
<td>0.154608154</td>
<td>0.0002358061</td>
<td>Y = -5.59607X + 19.73382</td>
</tr>
<tr>
<td>CCC:ROA</td>
<td>0.474790845</td>
<td>0.225426346</td>
<td>0.0000057603</td>
<td>Y = -0.0754716X + 14.38596</td>
</tr>
<tr>
<td>CURRENT RATIO:ROCE</td>
<td>0.316492491</td>
<td>0.100167497</td>
<td>0.0040837475</td>
<td>Y = -8.07322X + 24.30065</td>
</tr>
<tr>
<td>CCC:ROCE</td>
<td>0.316492491</td>
<td>0.100167497</td>
<td>0.0035570661</td>
<td>Y = -0.0333838X + 16.50640</td>
</tr>
</tbody>
</table>

The results in Table 4.3 confirm what have been the findings of many other studies done elsewhere in stock markets around the world. Deloof (2003), Afza and Nazir (2007), Lazaridis and Tryfonidis (2006), Garcia-Teruel and Martínez-Solano (2007), Sen and Oruc and (2009), Demirgunes and Samiloglu (2008), Mathuva (2009), Raheman and Nasr (2007), Uyar (2009), and Padachi (2006) conducted several different studies on companies listed on stock markets in other emerging and emergent markets throughout the world. A significant negative relationship was found to exist between the two working capital measures namely cash conversion cycle and current ratio, with the two profitability measures namely return on assets and return on capital employed. This was in contrast with what Lazaridis and Tryfonidis (2006) found when they did a research on Greek companies listed on the Athens stock exchange. They found that the working capital management within these companies had a significant positive correlation with profitability. This finding is synonymous with what one would expect to find in small to medium enterprises. This is because small and upcoming companies tend to lengthen their debtor repayment periods to attract more customers. It is also sensible to keep more inventory when one is starting up as you would not want to be out
of stock when new customers come knocking on your door. Not enough knowledge for one’s market also leads to increased investments in working capital.

**Figure 4.5: Scatter plot for ROA and CCC.**

**Figure 4.6: Scatter plot for ROA and Current Ratio.**
The most significant relationship for working capital management and profitability is the one between cash conversion cycle as a measure of working capital and return on operating assets as the measure of profitability. The R-square statistic is 0.225 and the p-value is <0.00005. Changes in working capital management can be used to explain between 10% and 23% of the changes in profitability of the companies analysed in this study. This shows a very significant negative relationship between working capital and profitability as all the regression equations have a negative beta as shown in the scatter plots above. Schilling (1996) used the economic value added as a measure of profitability in his investigation of working capital’s role in liquidity. This is a very significant measure of profitability as it takes into account the projects that have a positive net present value and not just the bottom line (Stewart, 1999). Stern et al. (2001), mentions that the most efficient measure of profitability for a company listed on any stock exchange is its market valuation. For this study, the market prices of the firms were not used as a measure of profitability since many other assumptions would have to be made, the most important of which is that the Johannesburg Stock Exchange is an efficient market. The share price of any company is influenced by other factors other than its current profitability thus correcting for these would have made the analysis a lot more complete.

Figure 4.7: Current Ratio & ROA regression residuals.
Figure 4.8: CCC and ROA regression residuals

The residuals of the CCC vs ROA regression line are the differences between the predicted value of ROA by the CCC values, and the actual value of ROA corresponding to that company’s CCC. They are expected to be normally distributed about the mean which lies on the calculated regression line of best fit (Lind et al., 2008). The residuals for the working capital management measurement parameters and ROA regression lines are normally distributed as shown in the above histograms.

The regression results show that the best measure of profitability which correlates more significantly with the working capital measures is ROA. This is shown by a multiple R result which is higher for all regressions with ROA than for regressions with ROCE. ROA is thus used as the profitability measure for regressions to test for hypothesis two. CCC has a higher correlation with ROA than the current ratio as shown by both the multiple R and R-square statistics which are higher for CCC than they are for the current ratio. All the regression results have a p-value of less than 0.05 making them significant at the 0.05 level of significance. The regression of working capital ratio against ROA has the lowest p-value which makes it the most significant regression result.
4.3.2.2 Hypothesis Two

Table 4.4: Regression results for hypothesis two

<table>
<thead>
<tr>
<th>Y:X</th>
<th>MULTIPLE R</th>
<th>R-SQUARE</th>
<th>P-VALUE</th>
<th>REGRESSION EQUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>INVENTORY:ROA</td>
<td>0.652454038</td>
<td>0.425696272</td>
<td>0.000000000023</td>
<td>Y = -0.01711X + 0.38203</td>
</tr>
<tr>
<td>DEBTORS:ROA</td>
<td>0.441457586</td>
<td>0.194884800</td>
<td>0.000029461216</td>
<td>Y = -0.00698X + 0.25214</td>
</tr>
<tr>
<td>CREDITORS:ROA</td>
<td>0.560954626</td>
<td>0.314670093</td>
<td>0.000000034723</td>
<td>Y = -0.01591X + 0.39704</td>
</tr>
</tbody>
</table>

Paulo (1992) speaks of the goal of any listed company as to maximise the wealth of its shareholders. Pringle and Harris (1987) mention that the benefits of increasing credit sales to maximise profitability should significantly outweigh the costs of bad debts. It should also be balanced with an increase in vendor financing, that is prolonging the creditor payment periods. Inventory on the other hand has to be the most optimally controlled of the three contributors to working capital. This is because in this study it has a p-value of <0.00000000002 when regressed with ROA which is the lowest for the three contributors to working capital. Inventory has a negative correlation with ROA with a multiple R of 0.6535 and an R-square of 0.4257. This could be because of the fact that inventory is the least liquid of all the current assets according to Block and Hirt (1997). The less liquid an asset is the more influence it would have on the liquidity of the company. Working capital is a measure of the firm’s liquidity represented by the current ratio. The other contributors to working capital are far more liquid meaning they would have less influence on profitability.

It is vital to ensure that a predetermined optimal level of inventory is kept to ensure that the organisation is more profitable. The Economic Order Quantity model can be used to determine optimum levels of inventory. Beraneki (1981), and Kim and Atkins (1978) oppose the use of this model to determine optimum levels of inventory. Due to the evident
significance of inventory in working capital management, a way of determining an optimum level of inventory is of extreme importance. As there is no other way of determining an optimum level of inventory, it is essential to use known sales patterns throughout the year to determine how much inventory needs to be kept.

Net Trade Cycle has been used also as a measure of working capital management. It is used by Shin and Soenen (1998) in their study on the efficiency of working capital management and profitability. This is calculated in a similar way as the cash conversion cycle is calculated in this study. It is very similar to the cash conversion cycle and its calculation is illustrated in the Table 4.1 in Section 4.1 of this paper. It is not used in this paper because the cash conversion cycle is used instead as one of the measures of working capital management.

![Graph showing the relationship between ROA and Inventory Days]

**Figure 4.9: Scatter plot for ROA and Inventory Days.**
The companies in this study of the JSE are big and well established companies that are listed on the Main Board with turnover of over R20 million. These tend to have a more defined set of customers and a more in depth knowledge of their customers. More established companies tend to have a closer relationship with their customers such that they can implement a make to order policy for inventory management. JSE Main Board companies are big enough to have a stronger bargaining power over both their suppliers and customers. They would be in a position to influence early settlement from their customers and late settlement for their creditors. Foate (2003) in his study of how to save a hundred million dollars mentions that huge corporations can save themselves up to 2% of their annual turnover by aggressively managing their working capital. This saving would contribute to the company's bottom line. With the latest advent of Total Quality Management, a lot of companies are implementing just in time inventory management to enable them to avoid overinvestment in working capital by keeping too much unnecessary inventory (Oakland, 2003).

**Figure 4.10: Inventory days and ROA regression residuals**

The residuals of this regression line are the differences between the value of ROA predicted by the inventory days, and the actual value of ROA corresponding to the inventory days for that particular company. They are expected to be normally distributed about the mean which
lies on the regression line of best fit (Lind et al., 2008). The residuals for the inventory days and ROA regression line are normally distributed as shown in the histogram above.

The regressions in this paper only involve two variables at a time. For this reason certain tests like the test for multi-co linearity were not performed. Multi-co linearity is the measure of the autocorrelation between two or more independent variables in the same regression equation (Lind et al., 2008). The use of control variables would also require the test of multi-co linearity to be performed. For this study, the use of control variables was deemed not critical for the regressions as only one independent variable was tested at a time. Deloof (2003), Afza and Nazir (2007), and Garcia-Teruel and Martinez-Solano (2007) performed their regression analysis using control variables. Bezuidenhout, Mlambo and Hamman (2008) in their study on investigating causality between cash flow and profitability did not use any control variables. The residuals for all the regressions were also tested for normality and they were seen to be significantly normally distributed.

![Figure 4.11: Residuals and Predicted Y values for WCR-ROA Regression.](image-url)
Keller (2008) defines homoskedasticity as the presence of variation around the regression equation that is significantly similar for all the different values of the non-dependant variables. Heteroskedasticity is the presence of a changing variability of the independent variables along the regression line. To test for this the predicted y values are plotted on a scatter diagram against the residual values. There should be no clear change in the spread of the plotted points. The tests for homoskedasticity were performed on the residuals by plotting them on a scatter diagram as shown above for the different regressions. The variation around the regression equation was found to be significantly the same for all values of the independent variables.
The use of dummy variables would have been recommended for this study if the sector effect of working capital management on profitability was to be considered in this study. For this study, an estimation of a more general relationship between working capital management and profitability was determined irrespective of the different sectors of the companies listed on the JSE Main Board. These factors and the findings in previous studies allowed for some of these tests to be omitted completely to keep the analysis of the study simple.

4.3.4 Summary of Findings

4.3.4.1 Hypothesis one

H₀ - The correlation between working capital management (current ratio and cash conversion cycle) and profitability (return on assets and return on capital employed) is not different from zero.

H₁ – The correlation between working capital management (current ratio and working capital ratio) and profitability (return on assets and return on capital employed) is different from zero.

The two different working capital measures (current ratio and cash conversion cycle) were regressed against the different measures of profitability (ROA and ROCE). All the results from the regressions indicate that there is a significant negative correlation at the 0.05 level of significance. The cash conversion cycle and the ROA have the strongest correlation with a Pearson’s coefficient of 0.474791 and an R-square of 0.225426. It is also the most significant at the 0.05 level of significance with a p-value of 0.00000576. The null hypothesis which states that the correlation between working capital and profitability is not different from zero is rejected at the 0.05 level of significance. The alternative hypothesis which states that the correlation between working capital and profitability is different from zero is accepted at the 0.05 level of significance.
4.3.3.2 Hypothesis two

H\textsubscript{0} – The correlation between profitability and each of the components of working capital (inventory, debtors and creditors) is not significantly different.

H\textsubscript{1} - The correlation between profitability and each of the components of working capital (inventory, debtors and creditors) is significantly different.

The three different components of working capital (debtors, creditors and inventory) were regressed against ROA as the most significant measure of profitability. All the results of the regressions indicate that there is negative relationship between each of the different components of working capital and ROA. The correlations are significant at the 0.05 level of significance. Inventory days had the highest multiple R of 0.652454038 and R square of 0.435696272 which signifies that it has a greater influence on ROA than debtor days and creditor days. The correlation of inventory days with ROA is also the most significant at the 0.05 level of significance as it has the lowest p-value of 0.000000000023. We therefore reject the null hypothesis which states that the correlation between profitability and each of the components of working capital is not significantly different and accept its alternative hypothesis which states that the difference is significant at the 0.05 level of significance.

4.4 Limitations of the study

The study is conducted on companies listed on the JSE’s Main Board. It is not indicated in any of the studies by Jordaan, Smit and Hamman (1994) and Paulo (1992) that a causality analysis on time series data was ever done to determine which of the two directly causes the other to change in a particular direction. In literature, there is only an indication of working capital management having to potentially influence the profitability of a company but without any definitive causality study being indicated. There also seems to be some implications of working capital management policies changing in accordance to the company’s profitability at any one given time. This is a limitation of this study as no time series data was collected to
allow for a Granger causality study to be performed first determining the direction of causality.

Profitability is difficult to compare between two companies across different sectors. It is even more difficult to compare between two companies from different industries. The parameters that are used to determine profitability for a firm are numerous. Some of these do not complement each other and differ significantly from one another making it difficult to select one universally representative one. The sizes of the companies differ significantly from one company to the next making comparison even more difficult. Defining a parameter to measure profitability uniformly is another limitation which will make the analysis of data difficult and may affect the validity of the findings. The study data is based on audited financial statements information. This information was collected from the McGregor BFA website using the Blink Version 2 application. For collecting information that is in bulk, using this software only allows one to collect figures without any explanation as to how the figures came about. This information is usually found in the notes of the financial statements and gives an indication of what assumptions were made to come up with the figures. This is necessary because despite most firms using the Generally Accepted Accounting Practices, there are some specifics that are only applicable to certain companies in certain sectors. This results in completely different statements based on the accountant who would have drawn the books up. The limitation in this instance is that financial statements information is used which is not extremely reliable and the use of different accounting techniques results in differing figures from sector to sector.
CHAPTER FIVE

5 RESEARCH CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSIONS

Working capital management has a significant impact on the profitability of the business. Companies listed on the Johannesburg Stock Exchange’s Main Board can save up to 2% of their turnover by applying more aggressive methods of working capital management. By maintaining a leaner inventory and collecting from debtors in a shorter period of time, companies are able to free up valuable funds which can then be used to fund other more profitable business ventures. Creditors should be paid after a longer period than the one that is allowed for debtors to settle. Inventory should be kept at optimal levels which are determined by the financial and operations managers using the history of sales patterns. The Economic Order Quantity model can also be used to determine an optimal level of inventory that the company needs to maintain.

This research study looked at the relationship between working capital management and profitability for companies listed on the Johannesburg Stock Exchange’s Main Board. A sample population of 83 companies was used. Those companies involved in the services industry were excluded from this study population as they do not use working capital management in the same way as other industries. Such companies have no inventory figures by virtue of their business. Regression analysis was performed using the current ratio and the cash conversion cycle as the measures of working capital management. Return on assets and return on capital employed were used as the measures of profitability. The results of this regression showed that there is a negative relationship between working capital management and profitability. The determinant in the regressions was working capital while the dependant variable was profitability.

The different components of working capital namely inventory, creditors and debtors were also regressed against return on assets as a profitability measure to determine if they individually influence profitability. Their influence was also investigated to see if it is significantly different from one working capital component to the other. The results showed
that inventory days have a more significant negative correlation with profitability. Creditor days and debtor days had a less significant negative correlation with profitability. The more significant negative correlation with inventory days was believed to be due to the less liquid nature of inventories. Of all the components of working capital, inventory is the least liquid meaning that it would be the least disposable in the event of liquidation. Working capital is a function of the liquidity of the company. This is why the current ratio can be used to describe the type of working capital management policy in place.

Managers of companies listed on the Johannesburg Stock Exchange can use aggressive methods of working capital management to enhance their profitability. Keeping inventories at a more optimum level can help to save costs which will help to boost the business’ profit figures. The business’ debtors should be given shorter periods to repay their amounts owing and longer repayment periods should be negotiated with suppliers. Vendor financing is when companies take longer to repay their creditors and avoid borrowing from the banks to settle any accounts payable. This provides the company with a cheaper source of finance and reduces the interest payable by the company at the end of every financial trading period.

The findings of this study are consistent with those of some earlier studies performed on stock markets in emerging and emergent markets in other parts of the world. Smaller companies tend to have a positive correlation between working capital management and profitability. The working capital management is managed according to how profitable the company is at that particular period in time.
5.2. DIRECTIONS FOR FUTURE RESEARCH

Deloof (2003) questions if working capital influences profitability or if it is not vice versa. This study did not look at the causality of working capital management and profitability using the Granger Causality Test. The causality was based on the findings from earlier studies. The Granger Causality Test can only be performed on time series data. For this particular study no time series data was available thus the causality test could not be carried out. For future research, time series data should be collected to allow for the Granger causality test to be performed. This will allow the direction of causality to be determined. Working capital management was the determinant in this study and this deduction was based on previous research findings. It would be very useful if a Granger causality study specific to the companies listed on the Johannesburg Stock Exchange’s Main Board was performed for referencing in future studies.

The measures of profitability in this study were based on accounting financial statements information. These are not very accurate for use in comparisons across different companies considering the many different methods of accounting available for companies to use. One accountant can come up with a different profit figure for the same financial information. Market information is the most accurate measure of profitability. Future studies should try to look at share price and other stock market information as the determinants of profitability. Economic value added is also another more accurate measure of profitability which can be used in future research.
REFERENCES


APPENDICES

Appendix 1 – LIST OF COMPANIES USED IN THE STUDY

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<td>Timber Suppliers</td>
<td>YRK</td>
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