



THE UNIVERSITY *of* LIVERPOOL

A deterministic approach on working capital to strategically improve company performance

Thesis submitted in accordance with the requirements of the University of Liverpool for the degree of
Doctor of Business Administration by Oscar Fernando Briones.

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ABSTRACT

The purpose of this investigation was to achieve three objectives: firstly, to determine to what extent profitability of Ecuadorian firms is linked with their short-term financial management; secondly, to contribute to current financial literature by providing additional variables that may explain business lucrativeness; and thirdly, to assist a real company using econometric tools.

The investigation used both quantitative and qualitative research methods to obtain information. The quantitative analysis was based on annual financial statements submitted to the Ecuadorian Superintendence of Companies over a seven-year period. A series of iterative models were created, using, pooled ordinary least squares, random and fixed effects under the context of panel data. The tests revealed that fixed effects should be used to explain profitability. Qualitative information was obtained by applying action research as a means to gain in-depth knowledge of learning through action in a real company.

It was found that short term financial management measured by cash conversion cycle both explains and augments profitability when working capital is diminished. Return on equity was not statistically significant; moreover, it discriminates in terms of capital structure. The investigation implemented return on assets which has been widely proven an unbiased and reliable metric to measure profitability; findings here support that view. In addition, two cash conversion cycle components: accounts receivable period and accounts payables period were found to have a significant relation with profitability. The investigation found that the ratios for fixed asset turnover and times interest earned contribute to explain firm performance. These are new control variables not previously reported, thus these findings fulfilled the second research objective.

The previous axioms served as the construct for company evaluation in the case of Cronos, a firm in the corporate sector. The assembled team strove vigorously to examine the situation of the company, debate action to be taken and take decisions. This process is reported. Ultimately, the set agreed to implement an aggressive working capital management strategy which steered the firm to profitability. The third research objective was therefore also fulfilled. This process allowed action research members to both achieve firm objectives and learn while acting as a single entity whose efforts have financial repercussions for all members.

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DECLARATION

This thesis is submitted in fulfilment of the requirements for the degree of Doctor of Business Administration at the University of Liverpool, United Kingdom. I declare that this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that this thesis has not been previously or concurrently submitted, either in whole or in part, for any other qualification at the University of Liverpool or other institutions.

Oscar Fernando Briones

March 2019

DEDICATION

I dedicate this thesis and dissertation to my late beloved parents Miryam Moncayo Perez (+) and Ernesto Briones Arbelaez (+), my grandmother Isabel Perez Sanchez (+). They would have been very proud of this paramount accomplishment. Also, I dedicate this work to my inner circle that have supported and walked with me this long journey, my son Kael Briones Baldeon, my wife Gabriela Baldeon Roca, and my sister Maria Isabel Briones Moncayo they have become my strength and fortitude in this endeavour all this time.

LIST OF ABBREVIATIONS AND ACRONYMS

AR	-	Action Research
ARP	-	Accounts Receivable Period
BHAR	-	Annual Return of Companies
COGS	-	Cost of Goods Sold
CA	-	Current Assets
CCC	-	Cash Conversion Cycle
CCE	-	Cash Conversion Efficiency
CR	-	Current Ratio
DAR	-	Days of Receivables
D	-	Dummy variable
DI	-	Days of inventory
Dividit	-	Dividends paid
DR	-	Debt ratio
DWC	-	Days of Working capital
DBA	-	Doctor of Business Administration
EBT	-	Earnings Before Taxes
EBIT	-	Earnings Before Interest Taxes
EBITDA	-	Earnings Before Interest Taxes Depreciation and Amortisation
FA	-	Fixed assets
FD	-	Financial debt ratio
FE		Fixed effects
FFA	-	Fixed financial assets divided by total assets
GDPGR	-	Annual gross domestic product growth
GLS	-	Generalized Least Squares
GMM		Generalized Method of Moments
GOI	-	Gross Operating Income
GOP	-	Gross Operating Profit
IA	-	Operating income plus depreciation/total assets
IP	-	Inventory Conversion Period

INV	-	Inventory
Inter _{it}	-	Financial expenses
IS	-	Operating income plus depreciation/net sales
LEV	-	Leverage
LN	-	Logarithm
Na _{it}	-	Total assets minus cash
Nf _{it}	-	Value of issued and repurchase shares
NOI	-	Net Operating Income
NTC	-	Net Trade Cycle
NWC	-	Net working capital
NWCL	-	Net working capital level
OC	-	Operating cycle
OI	-	First difference of earnings before interest and taxes
OI _{t-1}	-	Differenced lagged operating income divided by sales
OLS	-	Ordinary Least Squares
P/B	-	Price to book proportion
POLS		Pooled Ordinary Least Squares
Profitability		Earnings before interest taxes
PP	-	Payments Period
Q	-	Corporate performance
QR	-	Quick ratio
RCP	-	Receivables Collection Period
R&D		Research and Development
RE		Random effects
RESET		Regression specification error test
ROA	-	Return on assets
ROE	-	Return on equity
ROS	-	Return on sales
RTA	-	Return on total assets
SG	-	Sales growth
SME	-	Small and medium enterprises

SIC	-	Superintendence of Companies
TA	-	Total assets
TALOG	-	Logarithm of total assets
TI	-	Treynor Index
VIF		Variance Inflation Factor
WCM	-	Working Capital management
WCR	-	Working Capital requirements
WCSales	-	Working Capital divided by sales

CHAPTER ONE

OBJECTIVE AND OVERVIEW OF THE RESEARCH

1.1 INTRODUCTION

Contemporary business literature has developed a keen interest in working capital management (WCM) and its relation to profitability (Aktas et al., 2015; Deloof, 2003; Pais and Gama, 2015). Efficient working capital management has become a topic of primordial importance in company strategy to create added stockholder value (De Almeida and Eid, 2014). For corporations, WCM has become increasingly important for those firms who have played a major role in the development of national economies. Nevertheless, a considerable number of Small Medium Enterprises failures have been attributed to decision-makers' lack of adequate WCM. Pais and Gama's (2015) research on SMEs reveal that 67% of these companies' assets are short term. Furthermore, for Garcia-Teruel and Martinez-Solano (2007), 69% of small and medium Spanish companies finance their short-term assets with current liabilities. A high percentage of current assets and liabilities suggest that financial decision makers devote a considerable amount of time to the management of short-term resources.

Managers have additional interest in WCM, since investment choices are inextricably linked to the maxim of risk and return. The investor position on this subject is swayed and moulded by the dichotomy between risk averse and risk taker; where the latter will invest their financial resources into high-risk ventures, expecting handsome rewards. Investors that do not embrace risk will not have the same mien. They will not pour their resources into highly speculative companies, since it infers a high risk and a chance for losses as well. Likewise, working capital administration may be analysed under the lens of risk-return relations. Since managers must decide to invest more (or less) in a firm's resources, in order to receive a healthy return, this becomes a delicate balance of working capital components. Firstly, companies should have an adequate supply of cash to cover immediate business requirements, simultaneously avoiding an opportunity cost that sustains an unnecessary slack of cash. Secondly, the provision of credit to secure sales should be granted cautiously; this means establishing acceptable boundaries that neither compromise liquidity nor profitability whilst keeping inventories that are both sufficient to meet customer demands, but not excessive to cause a surplus which could have been used for other short term resources.

1.2 MOTIVATION AND NEED FOR STUDY

A profuse amount of company bankruptcy occurs because of deficient short-term financial management resource planning and control, as well as poor long-term financing (Padachi, 2006). Due to shortage of credit access and over dependence in short-term resources, it is contended that working capital is paramount for liquidity, firm growth and profitability (Deloof, 2003; Lazaridis and Tryfonidis, 2006; Padachi, 2006).

The extrinsic motivation for this study is twofold. Business owners in Ecuador require financing for their short-term operations, however this is often expensive as they borrow from an informal credit sector whose loan interests are staggeringly high (González et al., 2016). Due to inadequate regulation and a deficient financial education, commercial banking penetration and financial service use are low (Pais and Gama, 2015), leading borrowers to become victims of predator lenders. Concordantly, this study sought to increase financial knowledge for corporations and businesses in general to optimize short-term management resource and increase firm productivity. This is enhanced when expensive loans from the formal sector loans are implemented, significantly reducing interest expense and augmenting net income.

1.2.1 CRONOS WORKING CAPITAL DILEMMA

Due to the delicate balance between meeting short-term obligations and avoiding a cash opportunity cost, working capital and liquidity have become interlinked subjects of paramount importance for financial managers. Working capital encompasses quantity and composition of short-term resources and liabilities. These current assets are expected to become cash within a year. This is linked with company liquidity which ought not to be based on asset value, but from the cash flow generated from assets instead (Raheman and Nasr, 2007).

Although, the definitive company goal is to maximize profits, liquidity preservation is primordial. Unfortunately, liquidity is not perceived as relevant, until it reaches a critical point (Abuzar, 2004) of financial distress, which may ultimately lead to bankruptcy. Thus, a preventive approach of periodical liquidity revision including policies and status quo of working capital accounts becomes of utmost importance to avoid cash shortage and inappropriate augmentation of liabilities. Consequently, measurements of liquidity including current ratio, quick ratio, cash ratio and net working capital to total assets are needed for decision making of financial metrics. Nevertheless, cash conversion cycle (Baños-Caballero et al., 2013) and net trade cycle (Nobanee and AlHajjar, 2014; Shin and Soenen, 1998) are

considered enhanced liquidity and working capital metrics. Since these ratios consider length of time between inflows and outflows of cash from short-term management in days and days-sales respectively, liquidity and working capital not only affects honoring timely liabilities but also directly disturbs profitability. Cash shortages must be financed with additional debt; which generates an interest expense thus diminishing net income and therefore return on assets (Abuzar, 2004).

This investigation focussed on Cronos, a steel and iron intermediation enterprise which epitomizes the working capital dilemma. The firm has operated in the Ecuadorian market for 26 years and also has branches in Panama, Chile and United States. It acquires metallic materials in international markets and sells them locally. Products include but are not limited to shredded scrap, heavy melting steel 1&2, graphite electrodes, galvanized laminated sheets and steel coils. Their Pareto strategy relies on an 80/20 balance where the 80% is comprised of prominent iron, aluminium and steel casting companies and the 20% is composed of smaller customers.

The financial strategy adopted by company representatives had been challenged by a revaluation of their financial results. The business revenue was \$19,523,981, gross profit \$7,888,090, earnings before interest and taxes (EBIT) \$6,405,219, and net income \$3,078,685¹. These figures (appendix 9) are considered below the acceptable corporate sector benchmark mean². Therefore, company representatives believed underperformance represented an opportunity cost, since the firm had the potential to become more productive and profitable. The latter assertion was based on Cronos' financial advisor (myself) and the company's high-level representatives' examination of their balance sheets in comparison with corporations sharing similar characteristics (Table 7). Underutilisation of short-term assets and liabilities was found to be the underlying cause of company stagnation. Thorough scrutiny of company performance indicated poor short-term management of business assets. Since the balances of Cronos are quite similar to the corporate sector average, the business representatives and I concluded that the company needed to change its conservative strategy. Based on the findings from the literature review and quantitative analysis, it was recommended that Cronos should utilize better the core balance sheet components: accounts receivable, inventory, accounts payable and long-term debt. This entailed a shift in company policy towards an aggressive stratagem as suggested by Afrifa, (2015); Garcia-Teruel and Martinez-Solano, (2007); Nobanee et al. (2011).

¹ All reported figures in the thesis are in U.S. dollars

² On average corporate sector has revenue 26'169.365, gross profit 12'235.897, earnings before interest and taxes (EBIT) 8'751.653 and net income 5'851.657.

The previous assertions were supported by an analysis of company liquidity and working capital efficiency. Quick ratio was 1.68, implying that once short-term liabilities were paid only 0.68 cents remained (on a per dollar basis). On average, the corporate sector has 1.95, implying a higher coverage and slack of 0.95 once liabilities are honoured. It should be noted that the aforementioned ratios serve as an introductory working capital test revealing symptoms of anomalies and that cash conversion cycle and net trade cycle are considered more robust measures. Comparison of those metrics against corporate businesses with similar characteristics to Cronos indicated that market figures (corporate sector) were again more efficient. The average reported cash conversion cycle (CCC) was only 91 days whereas Cronos had an elongated CCC of 925 days (Table 19) and therefore required additional financial resources to finance current assets (Abuzar, 2004; Shin and Soenen, 1998). Furthermore, Cronos' free cash flow showed a huge deficit of \$-31,331,981, compared to a corporate sector average of \$412,458, which again indicated a company with financial distress and in need of liquidity.

For Baños-Caballero *et al.* (2013), working capital has a role in liquidity protection, acting as a failsafe in case of cash shortages. They argue that net trade cycle (NTC) is considered as an enhanced metric (better than current or quick ratio) for measuring liquidity (Nobanee and AlHajjar, 2014; Shin and Soenen, 1998). It provides an estimate of financing requirements regarding working capital (Cheng and Pike, 2003). Cronos' NTC of 93 days-sales was higher than the corporate sector average of 71 days-sales. This figure represented an opportunity cost and demonstrated why the company required additional debt to finance short-term resources.

1.2.2 GAP IN EXISTING LITERATURE

The motivation of this financial research was twofold, involving scholars and practitioners, seeking to respond to the need for academic knowledge in corporate finance. It was deemed imperative to determine quantitatively the relation between working capital management and profitability of companies regulated by the Ecuadorian Superintendence of Companies (SIC). Academic research on this topic locally is virtually non-existent in Ecuador. Concordantly, this would be the first academic and practitioner investigation that sought to determine profitability using financial metrics of working capital management that contribute to maximizing profitability and enhancing company value among companies monitored by the SIC and more specifically, Cronos, the company subject to investigation. The study would therefore be an important addition to the literature.

1.3 AIM AND OBJECTIVES OF THE RESEARCH

The aim of the investigation was to ascertain whether working capital management influences profitability of firms controlled by the SIC. The following three objectives were established to achieve the aim of the study:

1. To determine whether working capital management and cash conversion cycle components accounts receivable period, inventory period and accounts payable period affect profitability;
2. To expand the boundaries of current research and determine new plausible variables explaining profitability;
3. To assist a real company using quantitative tools to optimize working capital management and enhance profitability.

1.4 SUMMARY OF RESEARCH METHODOLOGY

The epistemological research stance depicts methods employed to obtain knowledge. The study objectives were investigated through two different perspectives. The investigation used a quantitative framework to develop a sound financial paradigm to evaluate and assist companies (Carr, 2006). Panel data was obtained from company information submitted to the SIC from 2000 until 2006, with an average of 30,113 companies per year. Financial institutions such as commercial and investment banks, insurance companies, mutual funds and brokerage firms were excluded from this study since financial procedures, regulatory protocols and working capital investment are extrinsic to the real sector investigated in this research. The dependent variable was return on assets. This metric allows for easy comparison with previous studies (Lazaridis and Tryfonidis, 2006; Sen and Oruc, 2009; Tauringana and Afrifa, 2013). The variable of interest was cash conversion cycle, which measures efficiency in working capital management. The main independent variable was controlled using several exogenous variables to isolate the pure effect of the variable of interest over the dependent variable.

Secondly, qualitative methods were used to examine the social constructionist process whereby Cronos employees and I sought to develop a mental construct of the truth (Young and Collin, 2004) about their company and the financial information through interactions and social exchanges of views and experiences (Ryan et al., 2002). These employees were studied as members of an action research set who had to make real decisions affecting the future of the company and conclude from the experiences they had, through observing events and objects (Lindgren and Packendorff, 2009).

1.5 MAIN FINDINGS

The methodology of this investigation allowed me to obtain meaningful information. Regarding the first objective, the data gathered revealed there is a negative relation between working capital management and profitability. This supports the findings of several other researchers who have carried out studies in the field, such as Deloof (2003), Garcia-Teruel and Martinez-Solano (2007), and Lazaridis and Tryfonidis (2006). It implies that when cash conversion cycle is diminished, profitability is increased. This occurs because companies have fewer costs and expenses. There are also fewer assets to finance, therefore firms require less debt.

The second and third research objectives are related to the contribution of the investigation and explored in the following section.

1.6 CONTRIBUTION OF THE RESEARCH

The investigation contributes to extant financial literature and fulfils the second research objective as it reports two new metrics that help explain lucrativeness. Fixed asset turnover describes asset utilisation referring to fixed asset investment efficiency; it calculates a firm's ability to generate sales per investment in long-term assets. The second metric, time interest earned (Timinter) evaluates a firm's capacity to managed indebtedness properly. Specifically, sales are measured against fixed assets (FATurn) and EBIT is used as a measure of business ability to cover its interest expense (Timinter); both ratios also explain return on assets from company profitability perspective.

The research highlights how these financial ratios indicate company performance; they were used as optimal metrics to analyse the situation of Cronos. In this case they were control variables that contributed to the cash conversion cycle and explained profitability. The third research objective was met, since Cronos was able to improve its financial performance by reducing its cash conversion cycle, drawing on the findings from this investigation.

1.7 OUTLINE OF THE RESEARCH

The thesis is comprised of seven chapters. Chapter two is a review of the extant literature in working capital management and profitability in the European Union, United States of America and South America. It highlights the importance working capital has in the short-term administration of company resources. Firms are for-profit enterprises and as such, they require the identification of variables and linking with profitability metrics. After a careful discussion of plausible determinants, it is suggested

that cash conversion cycle is the variable of interest explaining profitability. Its direction and magnitude are discussed, and a myriad of financial perspectives are compared.

Chapter three, focusses on the thesis methodology, including both quantitative and qualitative methods. The process used to obtain data is described and the legitimacy of the official source is discussed. Company characteristics and the selection of quantitative ratios for financial analysis throughout a specific period of time are considered. Financial econometrics axioms regarding how panel data ought to be a preferred method to explain return on assets is contested. In addition, the appropriate endogenous and exogenous variables are reviewed at length; in this section variables and determinants are explored within the limitations of concept applicability as well as data accessibility. Finally, the primordial hypothesis upon which the investigation is unfolded is explained.

Chapter four reveals the investigation results. A variable of interest is definitively established upon which numerous controls were applied to obtain isolate effects and obtain the pure outcome of the exploratory variable. Study results are condensed for analysis in a descriptive statistical table and Pearson correlation matrices are established to determine the relation of variables.

Chapter five contains a complex discussion of investigation results where the thesis outcome is compared and contrasted against the extant financial literature. The relationship between the variable of interest and the endogenous variable is revealed; a negative relationship was found on both Pearson correlation and the regression with fixed effects. The influence of research control variables is compared against findings reported in the literature. Furthermore, part of the investigation's contribution to the current literature is posited, since two new regressors are revealed that explain profitability.

Chapter six describes the qualitative side of this study which was conducted using action research, an *avant-garde* method for in-depth discussion. The thesis investigates the case of Cronos, a siderurgical broker. Although the company had respectable level of sales and gross margin, their financial metrics suggested poor financial management with aggravating short-term financial problems requiring urgent solutions.

Chapter seven reviews the investigation methodology employed and the outcomes obtained. Results and contribution to the literature are discussed. Limitations and prospective possibilities for future research are examined.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The principal objective of firms is to create value for their shareholders; this is measured by profitability. However, to maintain their operations and company growth, which consequently will increase profitability, firms need to finance their day-to-day activity. Financing is possible due to company liquidity, which may occasionally lead to tension between the amount of profitability and liquidity that the company requires. An adequate quantity of working capital will reduce problems of illiquidity and the interruption of business activities. At the same time, having unnecessary working capital could contribute to the misuse of companies' resources. Therefore, determining the correct amount of working capital has become a paramount task for managers and financial representatives who have become very concerned by this task.

Etiennot et al. (2012) claim that working capital is one of the least studied in corporate finance. They state that instead of making a proper analysis of investments in operating assets and its financing, firms choose to avoid the analysis and consequently often select inadequate alternative sources of funds. This brings inefficiency, illiquidity and loss of profitability. Modi (2012) defines net working capital as “a financial yardstick which represents operating liquidity available to a business”. He also establishes that the way to obtain it is by determining the difference of the day-to-day activities, regarding company inflows and outflows of financial resources. This margin offers the company a way to secure its maturing obligations during the period of its operation cycle. For De Almeida and Eid, (2014) the subject is of transcendental relevance; they mention that working capital research has become so important that it enables companies to create or destroy value for shareholders.

The relation between management performance and company goals turns paradigmatic at times, especially when plausible risk-return alternatives influencing working capital may be affected by contemporary worldviews. The research reviews the current state of the literature quantifying objectives through the lens of company performance, and considering the following: return on assets, return on equity, gross operating profit, and operating income. Also examined is the role of the ideal variable of interest to explain working capital management, contemplating short-term accounts, cash conversion cycle and net trade cycle. Furthermore, price-to-book ratio³ (P/B ratio), cash flows, operating cycle,

³ It compares the market value (current closing price) of the stock to its book value (most recent book value price).

leverage, and sales are used to provide accurate measures of the leading estimators (controls and independent variables) influencing business.

2.2 CONTEMPORARY FINANCIAL MANAGEMENT AXIOM.

Company goals are sustainable growth, profit and shareholder wealth maximisation (Brounen et al., 2004). These goals are interlinked with the perception of risk and return, which in turn leads to the depiction of a bilateral investor profile: risk averse and risk taker. The latter will pour their financial resources into high-risk investments, expecting handsome rewards. The former will accept smaller potential returns that are more likely to be realized. Likewise, working capital administration may be analysed under the lens of risk-return relations (Nazir and Afza, 2009). Subsequently, the financial decision maker needs to adopt an aggressive or conservative working capital management stratagem. Interestingly, companies may have an aggressive working capital strategy diminishing the balances in their accounts receivables and inventories aiming to lower storage and overheads costs, expenses and thus diminishes weighted average cost of capital (WACC) (Magni, 2015) increasing company profitability (Garcia-Teruel and Martinez-Solano, 2007). Alternatively, a conservative stance might be adopted where inventory increases augment sales and therefore accounts receivables increasing sales and profitability (Hill et al., 2010).

2.3 SHORT TERM FINANCIAL POLICY

Company use of a conservative strategy happens when the level of current assets is higher than current liabilities. This augmented position in assets allows businesses to be safe under unanticipated situations; ergo these firms are called risk averse. For Tauringana and Afrifa (2013) an increase in working capital accounts occurs and more sales and profitability can be expected. Under this strategy inventories are built up and more liberal credits are granted (larger balances on accounts receivables). These accounts are expected to have a positive relation with profitability; whilst accounts payable should have a negative relation with profitability. Current assets of firms using this strategy use less current liabilities and more long-term debt. However, increased levels of current assets will escalate opportunity costs and the cost of maintaining economic value. As inventories and their subsequent maintenance, insurance and storage increase, these carrying costs must also increase.

The investigation procured to determine and correct Cronos' sources of probable deviation from company goal of profit maximisation through working capital management. The robust balances of accounts receivables \$17,123,785 and inventories \$29,562,781 enlarged Cronos' short-term assets to

\$47,464,265. These were greater than the long-term assets (valued at \$1,136,529). In addition, the long-term debt (\$35,286,789) was bigger than current liabilities (\$3,998,073). However, these short-term obligations were lower than the company's current assets (appendix 9). Unequivocally, this company was following a conservative strategy as defined by Afrifa (2015); García-Teruel and Martínez-Solano (2007).

The opposite stance represents an aggressive strategy (risk taker) depicting firms that minimize inventories with fewer credit sales and less accounts receivable; these are diminished to reduce storage costs (Garcia-Teruel and Martinez-Solano, 2007) and overheads, thus augmenting profitability. For Afrifa, (2015) these companies have fewer current assets than fixed assets and their resources are financed with more current liabilities and less long-term debt. Concordantly, inventory and current assets are expected to have a negative relation with profitability; whereas accounts payable is anticipated to have a positive relation. This is supported by Nazir and Afza (2009) who mentioned that lower levels of inventory when an aggressive policy is used might increase profitability since lessening merchandise reduces carrying costs, which are the costs of inventory maintaining and opportunity costs. To reduce these costs, Wang et al. (2004) recommend the implementation of "just in time". Firms plan in advance and order materials for the goods manufacturing process at specific scheduled times; they reduce inventories and waste leaving a balance of zero. This technique reduces the cost of inventory maintenance and thus increases profitability. Aminu and Zainudin (2015) concur with the latter argument, claiming working capital administration ought to be an exchange between profitability and liquidity. The dichotomic use of working capital is perceived by Wang and Choi (2014) as a primary source of liquidity. This will enable firms to cover its debts and achieve company goals such as sustainable development. Therefore, it is important to choose whether to keep large amounts of working capital and decrease profits, keeping up with obligations, or, to have low levels of working capital, increase profitability and delay payment of obligations. (Maswadeh, 2015).

Current assets may be financed by current liabilities and long-term liabilities or owner's equity (Hovakimian et al., 2001). Nonetheless, the amount of long-term resources financing current assets is rather small, implying that the vast majority of short-term resources are financed by short-term obligations (Padachi, 2006). This brings advantages regarding financing. Firstly, short-term debt is less expensive than long-term debt. Secondly, firms circumvent long-term contracts. Financial institutions provide finance based on a line of credit, which may or may surpass 100% of the commercial value of

the collaterals. The credit terms allow most customers to payback on or before the duration of the loan diminishing interest expenses and increasing profitability (Sogorb-Mira, 2005). Nevertheless, financial institutions require a financial cost on the maximum amount and the cost is charged whether the customer is using the product or not. Additionally, lines of credit require a minimum compensating balance; this is an amount that cannot be used, although fees have to be paid for it (Sufi, 2007).

Among the aspects exerting influence on firms, Nwankwo and Osho (2010) mention that company policies might be unique due to the intrinsic and inherent differences among industries and firms, which involve product, manufacturing distribution and marketing schemes distinctive for each industry. Furthermore, industrial firms have longer operating cycles and therefore invest more in current assets, whereas service companies have smaller operating cycles selling mainly in cash requiring less working capital. Size is relevant, as big firms need more investments in working capital, i.e. inventories and receivables and consequently more revenue also; these firms establish relations and sometimes influence suppliers (Serrasqueiro and Nunes, 2008). The amount of fixed assets is also relevant as industrial firms require a heavier investment in long-term assets, whereas retail business may need less fixed assets affecting working capital differently. (Voulgaris et al., 2004). Levels of sales are intrinsically intertwined with cash conversion cycle and its components since a company using a conservative policy would like to expand their revenue by augmenting inventories which entail an increase in receivables and more payables. (Nazir and Afza, 2009). From a market competitive perspective, the amounts of inventories are directly related with competition. If competition is high then firms are required to have large balances of merchandise to follow market demand and compete against other businesses. This will entail higher levels of working capital, concordantly when competition is low firms might have reduced levels of inventories and therefore less working capital needs (Nwankwo and Osho, 2010). In addition, factors such as seasonality and supply conditions affect working capital. Some products may have high demand for a specific season, for example, beach wear in summer or toys in Christmas; these firms require higher working capital needs throughout high demand periods and lower requirements during other periods.

2.4 DETERMINANTS OF PROFITABILITY IN DEVELOPED ECONOMIES

Aktas et al. (2015) found that an optimal level of working capital improves operational performance and stock over the next period. Filbeck et al. (2007) highlight a positive relation between company management exerted by cash conversion and firm profitability. This intertwined relation on working capital requirements (WCR) has a dual impact on financial abilities and operational conditions for Hill

et al. (2010). If the latter is increased this leads to sales and volatility growth, due to a conservative strategy in working capital management. A conservative strategy will demand more financing capabilities due to larger WC. In exchange, firms are expected to yield a higher operating cash flow. The latter and size are indirectly related to financial distress and market to book ratio, implying that bigger, more profitable firms are less likely to have financial difficulties.

For Sen and Oruc (2009) it is feasible to increase profitability through effective working capital management. This leads to an augmented company free cash flow and stockholder return. Interestingly, an increased cash conversion cycle (CCC) enhances sales and *ceteris paribus*, business profit. However, the longer this period extends, the more financing it requires and profits are adversely affected (Deloof, 2003; Sen and Oruc, 2009). Working capital decisions have an impact on company performance; Baños-Caballero et al. (2013) and Kieschnick et al. (2013) suggest that higher value businesses have low investment in working capital. On average, an increase in net operating working capital diminishes excess stock return; this situation might scale even more for businesses with limited access to financing sources. In conclusion, a dollar invested in operating working capital is valued less than a dollar held in cash.

2.4.1 MODERN CONSTRUCTS OF WORKING CAPITAL

The use of working capital may have different usage according to each industry. Abuzar (2004) mentioned that capital-intensive industries need lower amounts of working capital and cash conversion cycle than companies which intensively utilize labour. Interestingly, liquidity does not affect profitability of capital-intensive firms while the opposite is true for labour intensive ones. Additionally, capital-intensive businesses bear larger cash conversion cycle than small firms.

Similarly, the research of Ching et al. (2011), looked for a relation between working capital management and profitability. The sample was separated into two clusters of sixteen organisations according to the following characteristics: 1. Working capital intensive, with current assets higher than fifty per cent of total assets. These companies included chemical, apparel footwear, textile, merchandising and delivery. 2. Fixed capital intensive, with current assets lower than fifty per cent of total assets; this cluster included products derived from petroleum, steel and refining businesses. The exogenous variables utilized for this research were days of receivables (DAR), working capital (DWC), days of inventory (DI), debt ratio (DR) and cash conversion efficiency (CCE). The explained variable was profitability. The authors proposed several metrics to measure it: return on assets (ROA) and return on equity (ROE), return on

sales (ROS). The aftereffects of this investigation in the working capital intensive cluster demonstrated that cash conversion efficiency has a positive relation with return on sales. Nevertheless, days of inventory, debt ratio and days of working capital have a negative relation with this predicted variable. There is no relation between days of accounts receivables and return on sales. Within this model, cash conversion efficiency has a positive association with return on assets. Overall, the other four variables have a negative relation with return on assets.

The examination of the fixed capital-intensive cluster utilized the same endogenous and exogenous variables as the working capital-intensive cluster. The outcome demonstrated that working capital; days of inventory, debt ratio, and cash conversion efficiency have a negative relation with return on sales. The explained variable return on assets had a negative relation with days of inventory, debt ratio and cash conversion efficiency. Interestingly, working capital and days of receivables demonstrated a positive relation. The authors did not discover statistically significant evidence to prove a relation between the explanatory variables and return on equity, neither in the working capital intensive nor fixed capital intensive clusters.

Unlike other research on the same topic, Ching et al. (2011) used specific industries, utilizing one hundred and sixty observations from thirty-two companies in five years. The thesis uses a robust methodology: panel data using seven years of data from superintendence of companies' database, following 46 companies analysing two dozen financial variables. Furthermore, the study follows units (i.e. companies) using independent variables (i.e. financial ratios) throughout time (using yearly data). The augmented number of company-observations, time span, ratios and econometrical methodology will usually provide an enhanced robust outcome.

2.5 DETERMINANTS OF PROFITABILITY

2.5.1 WORKING CAPITAL IN DEVELOPING ECONOMIES

The research of Haq et al. (2011) on Pakistani cement industries lead the authors to claim that working capital management is directly related, and therefore, affects firm's profitability. They also noted that WCM should be considered as one of the main decisions financial managers must make. Nwankwo and Osho (2010) agree, arguing that the main goal of working capital management is to ensure firm's ability to cover operating expenses, and that therefore its mismanagement would lead to a liquidity crisis or profits' reduction. Survival, stability and potential for growth of a firm depend directly on the effectiveness and efficiency of its management. The same authors note that the term *efficiency* has been

broadened because of its use in different fields but gets more specific when used in the financial sector. For them, efficiency refers to the ability of a firm to work appropriately without wasting resources in terms of money, energy and time. Therefore, efficient working capital management must meet the daily needs of the firm avoiding as much waste as possible regarding the terms mentioned above (Ukaegbu, 2014). In all enterprises, it is mandatory for management to pay attention to the working capital to determine how to distribute their investment, specifically whether the greater allocation goes to fixed or current assets (also it determines the level of liabilities). Therefore, cash is considered a paramount issue, as, to a large extent, it defines a firm's survival and growth among its competition (Nwankwo and Osho, 2010). The *modus operandi* entails a continuous process involving operations that determine the level of current assets, investment, sources of credit, and level of debt (long-term or short-term) which the firms have to use to finance their assets.

The research carried out by De Almeida and Eid (2014) in Brazilian companies considers a shareholder perspective; the authors claim that additional investment funding on working capital is less desirable than an additional investment in cash for the same period. Their findings support the hypothesis that the maintenance of excess levels of working capital leads to lower returns for shareholders, diminishing the value of the company in the market. Corporate profitability, risk and therefore company value is related to working capital management, which if reduced enhances firm profitability and value (De Almeida and Eid, 2014; Howorth and Westhead, 2003). This is corroborated by research conducted by Singhanian et al. (2014) into working capital strategies applied by managers in Indian manufacturing companies. Their findings suggest that cash conversion cycle reduction in a firm leads to an increase in its profitability. In addition, the study shows that an increase in accounts receivables period diminishes profitability. This supports the hypothesis made in Brazilian companies, about the relationship between the management of working capital management and corporate profitability. Similarly, Alavinasab and Davoudi's (2013) investigation on working capital supports the latter, concluding that indeed there is a negative relationship between cash conversion cycle and profitability. To improve their operation and increase shareholders' wealth, companies must adopt policies and plans to reduce the number of days of accounts receivable.

2.5.2 CASH CONVERSION CYCLE: A MANAGERIAL EFFICIENCY METRIC FOR ECUADORIAN FIRMS.

The implementation and measurement of cash conversion cycle and profitability require a metric that reflects the local and unique aspects of Ecuadorian management of resources in business. This entails the governmental legal framework, financial protocols and indigenous idiosyncrasy. Cash conversion cycle (CCC) and net trade cycle highlight as variables of interest to be followed which ascertain properly financial managerial efficiency. This measures the short term skewed vision of local entrepreneurs focusing on weekly and monthly activities and always planning for time spans of less than year. This reaction is the by-product of exogenous forces interacting and exerting pressure within the real sector. As central and local government, complex and ambiguous laws neither foster nor reward private entrepreneurship; government entities act as agents of collection extracting utmost financial resources from private businesses. The capacity of the financial sector to aid the productive sector is limited since they are also coerced by protocols and legal forces.

The importance of managing short-term resources is carefully crafted by cash conversion cycle. Firstly, this metric measures company liquidity, especially for smaller firms operated with fewer financial funds; secondly, as performance tool for measuring working capital efficiency. Furthermore, working capital efficiency is directly intertwined with profitability and firm value for Nobanee et al. (2011). However, the authors claim that cash conversion cycle definitions are rather dynamic. Overall, a short cash conversion cycle depicts smaller balances on inventories, due to an increase in inventory turnover or shortening accounts receivables and delaying payment to suppliers leading to a higher net present value of cash flows and an enhanced company value.

The research of Nobanee et al. (2011) and Shin and Soenen (1998) used for profitability earnings before interest taxes depreciation and amortisation divided by sales (or assets). However, they suggest an alternative definition for cash conversion cycle called net trade cycle; where every single cash conversion cycle component is divided by sales. The investigation showed that the variable of interest net trade cycle has a negative relation with company returns and profitability and the same relation was found with current and debt ratio. The current investigation adopts the traditionally accepted parameters, where cash conversion cycle is portrayed as accounts receivables in days plus inventory in days minus accounts payables in days⁴ (Deloof, 2003; Enqvist et al., 2014; García-Teruel and Martínez-Solano,

⁴ Table 5 depicts the definitions of each

2007; Lazaridis and Tryfonidis, 2006; Sen and Oruc, 2009; Tauringana and Afrifa, 2013). This metric has become a contemporary standard measure for working capital management, in response to an extensive criticism to current ratio and quick ratio; on the grounds that these are considered static (Baños-Caballero et al., 2012). Cash conversion cycle determines the current time allotment to transform a dollar outflow into a dollar inflow in the ordinary course of operations in a business (Gill et al., 2010). Lazaridis and Tryfonidis (2006) agree on the latter point, adding that it indicates how long companies can keep going if the operation stops. Also, for Deloof (2003) cash conversion cycle is the lag between the outlays of raw materials and the collection of sales. Nobanee and AlHajjar (2014) add that this cycle concentrates on the time span of financial flows within the cycle, isolating the funds dedicated to products as they pass through the cycle. Working capital accessibility is exposed to this inflow or outflow of financial resources, subjected to businesses credit terms, collections strategy and accounts payables turnover. Cash conversion cycle gives a more extensive perspective of liquidity, consolidating inflows and outflows of the firm.

Although Deloof (2003) used gross income as predicted variable, his research utilized cash conversion cycle elements employing panel data with fixed effects. Where receivables, inventories and payables coefficients are negative and significant; inferring that an increase in these variables entails a decline in the endogenous variable. Deloof (2003) also infers plausible endogeneity; as he mentions that profitability affects working capital management. A similar metric for profitability; gross profit was employed by Lazaridis and Tryfonidis (2006). They found a negative relation between the regressand and cash conversion cycle; their findings on receivables, inventories and payables are in accordance with those of Deloof (2003) and Shin and Soenen (1998). Unlike previous authors, Tauringana and Afrifa (2013) tested profitability exclusively using return on assets for profitability against cash conversion cycle and each of its components. Their empirical analysis regressed separately return on assets against cash conversion cycle using controls. The regression revealed that return on assets has a negative relation with accounts receivable and accounts payable. This is consistent with the findings of Deloof (2003) and Garcia-Teruel and Martinez-Solano (2007). However, the relation between inventory and CCC was insignificant, which contradicts the interpretations made by Deloof (2003) and Nobanee and AlHajjar (2014). The control variables such as current assets divided by total assets and fixed assets divided by total assets were negatively related to return on assets; implying that SMEs with more current assets are less profitable. However, logarithm of assets and profitability had a positive relation; implying big SMEs are more profitable. Similarly, Enqvist et al. (2014) found a negative relation between CCC and

profitability. This supports Deloof (2003), Garcia-Teruel and Martinez-Solano (2007), and also model one of Sen and Oruc (2009) and Lazaridis and Tryfonidis (2006), implying that to enhance profitability, CCC has to be minimized. The relation between accounts payable and profitability is negative; suggesting shorter cycles increase profitability. These results contradict Lazaridis and Tryfonidis (2006) who stated that profitable firms have longer payables. In contrast, Gill et al. (2010) did not find any relation between payables and profitability. They also highlight that minimizing inventories will enhance profitability.

2.6 HYPOTHESIS DEVELOPMENT

In the annals of financial literature, cash conversion cycle has a dichotomy in its direction. If the sign is positive, it assumes that there is lethargy for firms to pay back its obligations rather than the collective effort of selling and collecting inventory (on credit) to final consumers. For Mathuva (2010) a negative relation between cash conversion cycle and profitability diminishes the amount of current assets increasing profitability. Paradoxically, this aggressive strategy may lower profitability, due to aggressive collection from prompt payments or sales in cash. Correspondingly, delaying the disbursement for accounts payables to suppliers may lower profitability due to the opportunity cost of not ceasing cash discounts (García-Teruel and Martínez-Solano, 2010; Lazaridis and Tryfonidis, 2006). Nobanee et al. (2011) concurs with the latter as he mentioned that smaller cash conversion cycles entail an improvement in businesses profitability, since it reduces the amount of liabilities to finance company assets. This financing cost may be avoided if firms use credit from suppliers. Also, Nobanee (2014) mentioned that efficient firms could easily sell inventory on credit (increasing accounts receivables) and convert it to cash whilst adequately delaying the disbursement of accounts payable, enhancing business profitability. The negative relation between cash conversion cycle and profitability might turn into a paradox since for Taurigana and Afrifa (2013) the inverse relation between cash conversion cycle and profitability enhances the return of firms. However, when a business has fewer assets this is denominated as an “aggressive strategy” according to Garcia-Teruel and Martinez-Solano (2007). They mentioned that this strategy increases profitability, due to smaller investment in assets ergo companies have fewer assets to finance. Also, companies trying to sell for cash or attempting to collect receivables quickly may harm their relationship with their customers. Alternatively, for Deloof (2003) prolonged cash conversion cycles might seem to increase sales and profitability since firms are expected to carry more inventories and grant more financing to customers.

Moussa, (2018), Altaf and Shah (2017), Simon et al. (2018) used cash conversion cycle as a metric for working capital efficiency and ROA to measure firm profitability. Moussa, (2018) found a positive relation between ROA and CCC. Implying that companies with good performance have sufficient working capital resources. The positive connotation between the aforementioned variables, conveys that businesses with high profits are inclined to hold more accounts receivables, due to the fact that they sell more on credit and therefore more cash is held. Concordantly, the authors mentioned that investors in the stock market, are prone towards acquiring firms with a prolonged CCC, due to the expectation of a higher return, as elicited by the positive relation between these variables. A similar positive relation was revealed between ROA and CCC by Altaf and Shah (2017). However, their investigation also showed that ROA and CCC² have a negative relation. Their research suggests an inverse U-pattern relation, where firm performance increases with WC investment at low levels and decreases at high levels. This relation suggests a trade-off, exhorting firms to keep in equilibrium costs and remunerations against WC management. Additionally, the investigation examined the effect of size, cash flow, coverage ratio and White and Wu index to categorise companies under financial constraints. The investigation highlighted that the inflection point (under the U shaped pattern) for firms with financial restrictions is lower than on firms with less financial restrictions. This occurs due to the fact that companies with restrictions are more leveraged therefore interest and financing is more expensive.

A similar path was followed by Simon et al., (2018) who used both ROA and ROE as dependent variables and CCC and CCC² as exogenous variables. Research sought to explain the relation between WCM and company performance in Nigeria, moreover the quadratic relation of deviating from adequate WC levels. CCC and CCC² are the variables of interest measuring the investment in WC at low and high levels, respectively. The previous had a negative sign, whereas the latter had a positive direction with the before mentioned regressands. Implying that, timely cash improves business performance. Consequently, the negative relation between CCC and profitability proposes that firm efficiency lies in collecting cash promptly and deflecting a cash trap. Ramiah et al., (2014) agree with the previous statement as they mention that to overcome the financial crisis of 2007, treasurers of Australian companies changed their working capital policies. Maintaining liquidity became a priority, therefore they focused on conserving cash and diminishing cash conversion cycles. To that end, they reduced leverage and inventories which meant tightening credit and consequently reducing accounts receivable.

Financial literature regressors explain working capital regarding performance. However, it is currently not known what the plausible predictor variables exerting financial causality for businesses in a dollarized developing country are. The significance of this thesis lies in narrowing down the existing gap in the literature. The research used aforementioned regressors in a panel data study to determine which predictor variables explained profitability in a developing dollarized economy. Considering that enlarged inventories lead to augmented accounts receivable which requires larger financing, this entails an opportunity cost. The hypothesis statement and purpose of this investigation strives to a reduced level of working capital accounts leading to profitable firms. Ergo, it was hypothesized that:

H₁: THERE IS A NEGATIVE RELATION BETWEEN CASH CONVERSION CYCLE AND PROFITABILITY

2.6.1 CONTROL VARIABLES

Raising funds through liabilities may imply using commercial banks or issuing fixed income securities. Firms will select an indebtedness level balancing costs of debt, bankruptcy and taxes. The previous disbursement in the trade-off theory is considered an advantage because interests are tax deductible. Businesses will lower their income tax and earnings after tax are increased. Therefore, liabilities become less onerous than issuing equity (Atiyet, 2012). However, indebted companies become more dependent on financial institutions and their policies, since their liabilities and cash flows have become compromised. Interestingly, for Aivazian, et al. (2005) investments and leverage are negatively related, suggesting that capital structure is relevant in companies' investment strategies. Additionally, for Hovakimian et al. (2001) leverage and profits are negatively related, implying that an increase in levels of debt leads to a decrease in a profitability. This is consistent with an aggressive policy that recommends reduced amounts of liabilities to finance small short term assets. Interestingly, leverage has advantages not only for tax deductions and but also mitigates agency costs, consequently for Arthurs and Busenitz (2003) firms will be benefited from issuing liabilities. Since the cash flow available to meet obligations will become reduced, company managers will not permit cash misuse in irrelevant firm decisions. Furthermore, Serrasqueiro and Nunes (2008) found a negative relation between liabilities and performance in small–medium companies. This proposes that firms with higher levels of debt are less capable of financing projects to improve business performance, due to the urgency need to pay their financial commitments.

Due to local idiosyncrasy, Ecuadorian companies do not tend to implement pecking order theory whereby a systematic order of financial priorities is established. Companies will prefer to use retained income over debt, and short-term over long-term liabilities, due to asymmetry of information between business and investors. Sagner (2011) considers that lucrative companies will choose internal financing, then they will select some liability, and issuing equity will be the final alternative. This sequential order contemplates benefits acquired from using internal capital. These funds might be retained income, which circumvents liabilities which intensify costs of liabilities. This method entails proper management of collection and disbursement of float for firms to diminish costs and increase profits.

The research of Moussa, (2018) had a dual purpose. They proposed the assessment between WC and business performance and the relation between company value and firm performance. They used a capital structure ratio defined as debt to total assets, its negative relation with ROA (1% significance) meant that at lower levels of debt, companies will have a higher performance. In contrast, business performance is inversely related to firm size and debt level. Likewise, Madhou et al. (2015) investigated debt and found that the variable is a significant determinant of firm profitability. In their research they employed three measures of business performance: net profit (NP), economic value added (EVA) and ROA. On the regressions performed, the three regressands revealed a positive and a negative direction on size and debt respectively. Additionally, businesses with deficient corporate governance showed that between profitability and debt ratio there was a negative sign. However, non-profitable and loss-making companies heavily relied on debt.

Kusuma and Bachtiar (2018) employed ROA for business performance and CCC as WC determinant. They used debt as a control variable. They found a predominantly negative relation between debt and firm profitability. In light of the evidence found, the authors recommended that firm performance can be enhanced by carefully reviewing to whom credit is granted, thus allowance for bad debts is reduced. They also highlighted that the negative CCC sign suggests that the bigger WC is, the less profitable the firm becomes. During economic expansion optimistic managers increase leverage levels. In addition, they might be able to increase inventory and consequently expand credit. However, during times of financial hardship Ramiah et al., (2014) emphasized that, Australian firms focused on honouring current financial obligations and limiting the extent of new debt, focussing on credit risk and monitoring debt portfolio. To monitor the risk of default, large companies use the credit ratings of customers. The latter are based on the timeliness of debt payment. Additionally, it is highly recommended that the existing portfolio of accounts receivable should be diversified in different segments to reduce default risk.

Ecuadorian firms don't tend to open equity to new shareholders so a small group of shareholders (often family members) control equity and therefore run the business. From a financial perspective, this implies that companies rely on liabilities to finance their endeavours. The investigation needs to explore the dependency that firms have on debt, specifically short term debt and its implications, such as ease of raising money, either from commercial banking or by issuing short term debt (i.e. commercial papers). Based on the previous arguments, the following hypothesis was formulated:

H₂: THERE IS A NEGATIVE RELATION BETWEEN DEBT AND PROFITABILITY.

Although the research of Serrasqueiro and Nunes (2008) formulated that there exists a negative relation between fixed assets and profitability, many researchers take the opposite stance. Nucci et al. (2005) revealed a positive relation between intangible assets and firm performance. This investment is relevant for companies that effectively use information technology and innovation. Innovation has a positive repercussion on the growth of SMEs as it allows them to foster growth opportunities (Rogers, 2004) due to the implementation of new technologies and the creation of cooperation networks. This is corroborated by Voulgaris et al. (2004) who found that bigger companies with more tangibility (fixed assets) have higher risks of information asymmetry. These risks are reduced for SMEs. For these companies fixed assets are a relevant factor in terms of capital structure. The thesis incorporates the main premise of aggressive theory (Garcia-Teruel and Martinez-Solano, 2007), which is that a diminished amount of assets increases profitability. It is hypothesized that a reduced amount of long-term assets might increase firm profitability since a diminished balance of those resources requires a lowered amount of leverage. For instance, Padachi (2006) mentions that small-medium wood and metal enterprises' asset policies entail a conservative investment in property, plant and equipment. According to Padachi (2006), some industries have invested up to 70% in liquid assets, implying that these industries function adequately with a relatively small investment in long term assets. These companies rely on current asset turnover to make more profits. Therefore, the investigation postulated the following hypothesis:

H₃: THERE IS A POSITIVE RELATION BETWEEN FIXED ASSETS TURNOVER AND PROFITABILITY.

For Gu (2002), liquidity ratios denote immediate default risk, and solvency ratios calculate business metrics measuring a firm's financing bankruptcy probabilities. Furthermore, leverage ratios measure the degree of indebtedness of a firm. Times interest earned ratio is a leverage measure that determines the

level upon which interest paid is covered by business earnings. Financial institutions are interested in lending their financial resources to companies exceeding their interest payments (Sengupta, 1998). A similar perspective is shared by Aivazian et al. (2003). For them, time interest earned represents the ability of a company to cover its liabilities timely, which is defined by earnings before interest and taxes divided by interest paid. The bigger this ratio is, the higher the number of times a company can be indebted. For Gu (2002) a company's operating efficiency helps businesses augment profitability and liquidity lowering default risk. Research by Kim and Gu (2010) supports Gu's (2002) premise as they mentioned that bankrupt firms have lower levels of operating cash flows and times interest earned ratio. Moreover, Kim and Gu (2010)'s research highlights the importance that given a level of liabilities, companies can generate enough operating cash flow to cover financial obligations measured by time interest earned. The latter is primordial to lower financial distress. The authors also recommend adopting a conservative approach, limiting indebtedness and maximizing cash flows.

Lyroudi and Lazaridis's (2000) investigation found a positive relation between cash conversion cycle and times interest earned. Their study was based on Pearson correlations and implies only that there is a positive degree of affinity between the two aforementioned variables, consequently no causality might be inferred. However, in terms of risk–return relations, Shi (2003) mentions there is a negative relation between risk and times interest earned depicting profitability. Thus, this investigation sought to test the following hypothesis:

H₄: THERE IS A POSITIVE RELATION BETWEEN TIME INTEREST EARNED AND PROFITABILITY

The research on small family-owned businesses conducted by Chrisman et al. (2004) reveals that these companies can circumvent the agency costs that large companies have since they are smaller and managed by family members who are capable of monitoring operations closely. Family's close business control avoids manager's personal interests and therefore diminishing financial losses and protocol controls enhancing profit. Additionally, Alvarez and Crespi (2003) found that smaller firms have uncanny abilities to adapt, overcome and innovate more easily than big firms; since larger firms have bureaucratic protocols and slower decision-making and approval processes.

In contrast, Serrasqueiro and Nunes (2008) consider that company size influences profitability since bigger firms are able to produce using economies of scale: more quantities produced reduces fixed costs

per unit, enabling a firm to increase profits (Qian and Li, 2003). Large companies also have more bargaining power and profitability compared to small businesses which allow them to have more influence on both customers and suppliers (Porter, 2008) which allows them to increase profitability (Crook and Combs, 2007). Bigger firms can influence company-customer trading relations with regards to credit terms, payments, time and delivery. Similarly, large businesses may have an effect on suppliers, since they may impose payables terms like time, amount of payment per period and product quality.

Moussa (2018), Altaf and Shah (2017), and Madhou et al., (2015) employed size defined as logarithm of total assets. In the research of the Egyptian market, Moussa (2018) found that firm size was inversely related with ROA, the dependent variable. This indicates that small companies had greater growth chances and were more profitable than big firms. The investigation also scrutinizes firm value, all the regressions performed suggested a significant negative relation between firm size and company value as well. Inferring that small companies maximize profits. Interestingly, CCC is positively associated with ROA, suggesting that Egyptian companies with more WC resources are profitable. As a control, variable size was also employed by Altaf and Shah (2017). Firms were classified according to size: this variable was used as a financial constrain (using a dichotomous variable 1 for companies with financial difficulties 0 otherwise). Similarly, for Moussa (2018) this control variable had a negative direction, suggesting that smaller firms are more profitable. However, for Madhou et al., (2015) large companies have easier access to financing products and make more investments, whereas the other smaller firms have less costs. As stated earlier in H2, the authors used NP, EVA and ROA as endogenous variables, regardless of the regressand. This variable reported a positive direction, implying that big companies are more profitable. These kind of firms use their strategic corporate advantage in terms of resources to generate more profit.

Very large companies have easier access to financial resources than their smaller competitors (De Almeida and Eid, 2014). Due to their level of revenue and cash flows, larger firms are able to pay back liabilities, epitomizing a lower default risk. Furthermore, because of asset size, tangibility (collateral) allows them to pledge assets easily for borrowing. Additionally, corporate banking customers have preferred terms on loans; their interest rate is smaller due to a diminished perceived risk (Sufi, 2007). A multinational corporation's size and volume of operations enable them to operate simultaneously in several countries. The volume of operations enables them to operate simultaneously and achieve efficiencies of scale, thus increasing revenue, so long as they take care to consider the local adaptation

required to capture consumer interest in diverse markets (Vermeulen and Barkema, 2002). Therefore, the investigation sought to test the following hypothesis:

H₅ THERE IS A POSITIVE RELATION BETWEEN SIZE AND PROFITABILITY

Providing credit is an opportunity to expand revenues and profitability by selling whilst temporarily postponing the collection of cash. Trade credit represents an investment in company assets and has impact on liquidity and profitability. A large balance represents uncollected amounts and a longer period to receive the quantity owed by consumers, whilst short balances entail effective management of customer's collectibles. For Abuhommous (2017), companies with a good financial position might opt to extend credit to customers with challenging credit rating to expand firm's market share. Therefore, businesses purposefully increase prices of goods and services and in exchange consumers receive credit, but at a higher price. Granting credit generates operating efficiencies for businesses, as it creates a dichotomy between product delivery and money collection from consumers according to demand for products. In periods of low demand credit products turnover decrease, whereas in high demand period products rotation increase (Bougheas et al., 2009). Consequently, credit will be provided to stimulate sales in period of low demand. Conversely credit will be diminished in period of high demand. Nevertheless, firms that grant more credit to customers try to lure them to acquire company goods or services. In addition, credit is a strategy to stimulate revenues in periods of low sales (García-Teruel and Martínez-Solano, 2010). Reducing credit terms might decrease the attractiveness of a firm's goods or services leading to a sales contraction. Similarly, delays in customer payments leads to a shortage of liquidity.

The implementation of cost reduction through operating efficiencies for Cheng and Pike (2003) provides an incentive to extend credit for companies; this diminishes cash balance in precautionary requirements, as businesses with volatile sales mitigate uncertainty to specific collection periods where it is known that consumers will honour their obligations and a firm's liquid reserve is going to be at the lowest level.

Escalation of trade credit increases profitability and reduces firm's costs. The previous entails an increase in revenues, and simultaneously diminishes inventories and their maintenance costs (Gill et al., 2010). García-Teruel and Martínez-Solano (2010) corroborate the previous statement, arguing that an increase in accounts receivables implies reduction in warehouse costs and excessive inventory.

However, an enlarged investment in receivable has negative connotations as well since providing credit represents costs for businesses and a decrease in profitability (Cheng and Pike, 2003). Consequently, companies will require resources to finance accounts receivables, if these resources come from internal funds (i.e. retained earnings) these represent an opportunity cost. Nevertheless, external funds represent a financial burden, since firms have to honour interest expense on debt. In addition, augmented receivables represent an opportunity cost due to customers delayed payments. If the credit period and discounts (i.e. cash discounts) are not competitive vis-à-vis industry benchmarks this may lead to company valuation distortions. Carter and Van Auken (2005) also found that companies that perceived risks in the environment prefer to diminish accounts receivables. Furthermore, optimal credit level of receivables should be established, for García-Teruel and Martínez-Solano (2010) since that is where the marginal revenue of receivables equals marginal cost.

The scope of the investigation of Moussa (2018) was framed by the financial crisis of 2007. It sought to explain the relation of WCM (using CCC) of Egyptian firms with company performance measured with ROA. Research revealed that profitability is positively related to accounts receivables, meaning that these firms increase their receivables to augment higher profits. Moreover, it is mentioned that CCC and ROA are positively related, which means that profitable companies are prone to have more receivables, due to the fact that these businesses have more cash to lend to customers.

Madhou et al., (2015) studied company characteristics from the perspective of the state of working capital considering they had a surplus or a deficit. They regressed NP, EVA and ROA using accounts receivable as the control variable. This variable had a positive coefficient. The authors highlighted that the positive direction of accounts receivable and cash is intertwined with the performance of businesses with both good and bad corporate governance ratings. Moreover, the positive sign in the independent variable is also found for extremely profitable firms. Remarkably, profitable firms exhibited a positive coefficient whilst, non-profitable companies display a negative sign on cash. To ameliorate the cash mismanagement and liquidity risk Ramiah et al., (2014) mentioned that credit risk becomes a priority. Consequently, the potential default risk of debtors was carefully analysed prior to granting sales on credit. The examination of credit worthiness and the requirement of guarantees became a norm to ascertain credit control. Additionally, to circumvent bad debts companies looked into late paying consumers and used credit collecting agencies. Moreover, firms decreased credit terms and granted bigger prompt payment discounts to reduce the cash conversion cycle.

Moreover, if the company does not charge an interest rate on credit sales, firms are financing the acquisition of goods and services for free. Even worse, relaxing trade credit increases credit risk (default risk): the possibility that a part of the accounts receivable might not be collected (Cheng and Pike, 2003). The research of Deloof (2003); García-Teruel and Martínez-Solano (2010); and Gill et al. (2010) concludes that diminishing trade credit increases profitability. Consequently, the investigation postulated that:

H₆: THERE IS A NEGATIVE RELATION BETWEEN ACCOUNTS RECEIVABLE PERIOD AND PROFITABILITY

Accounts payable describes the obligations companies have with third parties, specifically suppliers. Lower balance in this account means that these liabilities have been honoured; concordantly higher balances imply that these obligations have not been met.

Perry et al., (2011) mentions that a “cost-decreasing” bootstrapping technique of delaying payments to suppliers adds value to firms by reducing the need for cash. This is a common technique for companies with limited access to financing (i.e. small companies) and undercapitalisation. This method is frequent for small companies. When perceived risk levels are high; firms might be prone towards delay of accounts payables (Carter and Van Auken, 2005). Small firms seeking financing should capitalize on customer-supplier relations to consolidate credit history, as this might enable them to gain a good credit rating and later new sources to finance assets (Ebben and Johnson, 2006).

Interestingly, trade credit is a form of financing for young and/or small businesses with difficulties to obtain credit services from financial institutions; in this context financing with suppliers becomes a primordial source of funds to finance short-term assets (García-Teruel and Martínez-Solano, 2010). Another reason for delaying payments for Ebben and Johnson (2011) is cash flow improvement as the result of longer-term supplier's negotiations or leasing instead of buying. Credit term negotiation is crucial as it sets the terms for payables payments, when companies gain relevance for both suppliers and consumers it gains influence in those relations to negotiate disbursement terms.

A negative relation between payables and profitability is observed in less profitable companies, which wait more time to pay their obligations (Falope and Ajilore, 2009; Raheman and Nasr, 2007). This implies that obligations have not been paid and that discounts and incentives provided by suppliers to encourage early payments have not been utilized. Concordantly, for Raheman and Nasr (2007)

and Deloof (2003), accelerating the payables process may increase profitability since businesses may cease the discounts for early payment. In addition, if a firm provides credit, it represents a relevant cost reducing profitability since the percentage discount for days becomes a large figure in annualized terms (Annual Percentage Rate).

As cited earlier in H2 the research of Madhou et al., (2015) used NP, EVA and ROA as dependent variables. The investigation scrutinised the Australian market, where data reveals that liquidity risk affects firms, when NP and ROA are used to measure corporate profitability. More mixed outcome is displayed, as their regressions found that accounts payable is negatively associated with ROA. However, the authors believe that different regressands measuring performance might yield different results, as this independent variable is positively related with NP and EVA. Additionally, the research shows that companies with working capital deficit exhibit a negative coefficient between debt and firm profitability. The same negative relation was found between debt and corporate governance. Paradoxically, in Ramiah et al., (2014), a minority of treasurers decided not to use payable terms in their entirety. Although this seems to be a contradiction in light of the premises exhibited throughout the thesis (since it represents an opportunity cost). The argument of those managers was that they wanted to honour their obligations timely, and also that the invoices were relatively small in financial value and treasurers were reluctant to face late payment penalties.

The investigations of Deloof (2003), Nobanee (2015), García-Teruel and Martínez-Solano (2010) found a negative relation between accounts payable and profitability. However, Tauringana and Afrifa (2013) specify that if an aggressive working capital management strategy is employed there is a negative relation among cash conversion cycle, inventory, accounts receivable and profitability, while a positive relation is expected between accounts payable and profitability. Nevertheless, if a conservative working capital management strategy is used then a positive relationship among cash conversion cycle, inventory, accounts receivable and profitability would be expected while a negative relation between accounts payable and profitability should be anticipated. However, empirical evidence of the relation of cash conversion cycle (and its components) and profitability is diverse. In light of these events, the investigation adopted the traditional financial posture and hypothesized:

H₇: THERE IS A NEGATIVE RELATION BETWEEN ACCOUNTS PAYABLES PERIOD AND PROFITABILITY

Working capital for Raheman and Nasr (2007) entails the delicate management and decision of the balance and composition of current assets and its short-term financing. Current assets are the short-term firm resources expected to be converted into cash within one year. Eljelly (2004) adds that efficient company liquidity requires planning and controlling current assets to eliminate the possibility of neither missing short-term obligations nor investing in excess short term resources.

Asset turnover measures a company's capacity to generate earnings from assets, whereas profit margins measure its ability to monitor costs incurred to produce sales. The amount of asset turnover depicts its asset utilisation and profit margin describes its operating efficiency. The research of Fairfield and Yohn (2001) found a positive relation between asset utilisation and prospective profitability change. Therefore, changes in asset turnover are mirror images of a company's productivity and are valuable to forecast prospective profitability.

To ascertain whether a business uses a conservative or aggressive strategy the ratio of current assets divided by total assets is employed⁵. An aggressive strategy accentuates that a diminished balance of working capital components magnifies profitability (Deloof, 2003; Shin and Soenen, 1998). Contrarily, for García-Teruel and Martínez-Solano (2007), a conservative policy is characterized by large investment in inventories and accounts receivables. Like the aforementioned authors, Nazir and Afza (2009) sought to explain return on assets. Although their investigation does not contradict the others, they add that an aggressive policy indeed has a minimal balance in short term resources compared to fixed assets. Conversely, a conservative strategy has a significant amount invested in current assets (as a fraction of total assets) involving less profitability and an opportunity cost. Additionally, to finance these assets firms might employ aggressive financing using more current liabilities and less long term debt, whereas conservative financing utilizes more long-term liabilities than current liabilities. Interestingly, businesses using aggressive financing concentrate on short-term liabilities, jeopardizing liquidity. Furthermore, Nazir and Afza (2009) found that a working capital investment policy has a positive coefficient on current assets divided by total assets. This reveals an inverse relation between aggressiveness of investment and return on assets (ROA), meaning that as current assets divided by total assets increases, the degree of aggressiveness diminishes and ROA increases.

⁵ If current assets divided by total assets >0, conservative OR current assets divided by total assets <0, aggressive

The investigation sought to answer whether asset utilisation as a proportion of total assets is an optimal control for profitability, therefore:

H₈: THERE IS A POSITIVE RELATION BETWEEN CURRENT ASSETS DIVIDED BY TOTAL ASSETS AND PROFITABILITY

2.7 CAPITAL STRUCTURE

Extant literature highlights two theories explaining the debt–equity composition. These are relevant since the level of leverage used by companies is a variable allowing funding for company assets. Trade–off theory suggests that capital structure mix of debt and equity will bring forth equilibrium between tax shield benefits against agency costs and bankruptcy. More profitability according to Strebulaev (2007) reduces the prospective distress costs. Thus, firms increase tax benefits by increasing indebtedness and this is corroborated by the positive correlation between debt and profits Fama and French (2006) also substantiate this correlation. However, Myers (2001) argues that the inverse relation between debt and profitability is a deteriorating capital structure commonality which is often rejected by academics. For Myers the trade–off theory controls debt ratios since companies will acquire debt up to marginal value of tax benefits on additional liability are offset by the increment in present value of financial distress costs. The latter are agency costs, reorganisation and bankruptcy costs. Myers continues to contest the theory as he mentions that if this theory is entirely correct then profit–maximizing companies should not pass interest tax shield when the chance of financial distress is small. However, there are many profitable firms with outstanding credit ratings with low debt like Microsoft.

Pecking order theory explains that a hierarchy of financing sources is provided in consonance with information asymmetry. For Strebulaev (2007) profitable companies diminish their exogenous source of financing therefore reducing leverage. More specifically pecking order is motivated by adverse selection expenses. Businesses prefer internal finance to external financing (Frank and Goyal, 2003). However, when the latter is required, companies prefer liabilities to equity. There are fewer information costs associated with liabilities issues, so equity is less likely to be issued. Although, Myers (2001) confirms the previous statement, implying that the majority of external financing comes from debt, this is contested by Frank and Goyal (2003) who state that the amount of external financing in Americans indeed comes from equity. Pecking order does not work properly for small high growth businesses it best performs for large companies with continual trading record. Frank and Goyal (2003) argue that big high growth companies will naturally require vast amounts of financing; these entities will report high

indebtedness ratios, since they are reluctant to issue equity. However, Barclay et al. (2006) contest the previous argument, noting that high – growth businesses use less liability in their capital structure. This theory for Frank and Goyal (2003) presupposes maturity and priority within firm’s capital structure. This predetermined order decrees that securities with less information cost should be supplied first, before securities with greater information cost. Thus, assuming that internal financing is exhausted and that external financing is required then short term debt should be issued before long term debt. Myers (2001) confirms the previous tenet as he states that if external financing is required for capital expenditure, companies should issue firstly the safest financial instruments (securities). In the case that excessive cash flow is generated, this should be used to pay back debt instead of repurchasing equity.

Lastly, the research of Danis et al. (2014) found that when companies are in or close to their optimum level of indebtedness the cross sectional correlation of profitability and debt is positive (contradicting previously discussed authors) and sometimes negative. Results are aligned with dynamic trade – off in which variant capital structure rebalancing is ideal, implying periods of inactivity until benefits from leverage adjustment compensate the costs.

Interestingly, for Fama and French (2002) trade–off and pecking order models foresee that higher variance of company cash flows lowers the amount of liabilities. Similarly, static version pecking order theory proposes that an augmented investment steers towards more borrowing when retained income is fixed. However, the dynamic version of pecking order theory predicts that more investment decreases debt.

2.8 SUMMARY OF PREVIOUS RESEARCH

Table 1 compiles the aim of previous investigations on the relation of working capital management and profitability. The summary depicts author, year of publication, country, sample and the financial econometric methodology employed as well as the metrics inducing causality and dependency. Their corresponding sign is also shown, (+) refers a positive relation (-) refers a negative relation. This is important to compare and contrast against thesis findings. On the latter, outcome direction across scenario is fundamental, to analyse estimator’s coefficients consistency

Table 1. Summary of previous research
Based on the relation between working capital management and profitability.

Author and year	Country	Objective and main methodology	Sample	Variable	Principal finding positive (+) negative (-)
Aktas et al. (2015)	United States of America	Net working capital management and firm performance	77,001	Excess net working capital Firm size Intangible assets Leverage Age R&D Risk Fixed asset growth Cash reserves	- - - - - + + - -
Kieschnick, et al. (2013)	United States of America	Working capital and shareholders' wealth Panel data regression analysis using random effects	3,786	Cash plus marketable securities Accounts receivables Earnings before extraordinary items plus interest Total assets minus cash holding Total assets minus cash holdings and net operating working capital Research and development Interest expense Common stock dividends paid Market leverage Total equity issuance minus repurchases plus debt issuance minus debt redemption NWC: Accounts receivables plus inventory minus accounts payable	+ + + + + - + - + + +

Gill et al. (2010)	United States of America	Relation between Pearson correlation and weighted least squares	88	Gross operating profit Cash conversion cycle Accounts receivables period Inventory period Accounts payable period Logarithm of sales Debt Financial assets	+ + - + + - -
Filbeck et al. (2007)	United States of America	Explain working capital and shareholders wealth Statistical regression	1,094	Cash conversion efficiency rank Days of working capital rank	+ -
Shin and Soenen (1998)	United States of America	Relation between Net trade cycle and profitability. Correlation analysis and regression	58,985	Net trade cycle, current ratio Total debt/total assets Change in sales	- - +
Nobanee and AlHajjar (2014)	United States of America	Relation between operating income and working capital Generalized methods of moments (GMM) Dynamic panel data	5,802	Lagged operating income to sales Quick ratio Total debt to equity ratio Sales growth Receivables collection period Inventory conversion period Payable deferral period Net trade cycle	+ + + - - - - -
Deloof (2003)	Belgium	Relation between working capital management and profitability Correlation and regression	1,009	Accounts receivables Inventory Accounts payable Cash conversion cycle Logarithm of sales Sales growth Debt Financial assets	- - - - + + + -

Lazaridis and Tryfonidis (2006)	Greece	Relation between working capital management and profitability Correlation and regression	131	Accounts receivables per. Inventory period Accounts payable period Cash conversion cycle Debt Financial assets	- - - + - - +
Sen and Oruc (2009)	Turkey	Relation between WCM and profitability Panel data regression analysis (fixed effects)	49	Accounts receivables period Inventory period Accounts payable Cash conversion cycle Current ratio	- - + - -
Tauringana and Afrifa (2013)	United Kingdom	Relation between WC, its components and profitability Panel data regression analysis with random effects	133	Accounts receivables period Inventory period Accounts payable Cash conversion cycle Debt Size of companies	- - - - + -
Baños-Caballero et al. (2013)	United Kingdom	Relation between working capital management corporate performance and financial constraint Regression analysis, a two step generalized method of moment (GMM)	258	Net trade cycle Leverage Size of companies Sales growth	- + - +
Enqvist et al. (2014)	Finland	Relation between working capital management and profitability Ordinary least squares regression	1,136	Return on assets Accounts receivables period Inventory period Accounts payable Cash conversion cycle Current ratio Debt ratio Sales Operating income Growth	- - - + - - + + +

De Almeida and Eid (2014)	Brazil	Working capital and company value Panel data regression analysis using fixed effects	1,914	Cash value of firm Earnings before interest, taxes and extraordinary items Total assets minus the value of cash and working capital Value of financial expenses Dividends paid Leverage ratio Firms net financing Working capital	+ + + - + - + +
García-Teruel and Martínez-Solano (2007)	Spain	WCM and profitability regression on Spaniard SME Correlation and regression	8,872	Accounts receivables Inventory period Accounts payable	- - +
Moussa, (2018)	Egypt	Inquire the influence of working capital management on company performance and value.	437	ROA (lagged one period) Cash conversion cycle Growth Age Size Leverage GDP	+ + + + - - +
Altaf and Shah (2017)	India	Relation between working capital and business performance	437	ROA Market value equity + book value debt/book value assets CCC Accounts receivables period Inventory period Accounts payable period LN of Assets (sales/ previous year sales) – 1 financial assets/total assets Number of years' company was founded Total debt to total assets Current assets/ current liabilities	+ + + + + + - + + - +

Madhou et al. (2015)	Australia	Scrutinises the relation of corporate profitability, and WCM and businesses characteristics	1751	ROA ROA _{t-1} Accounts receivables period Inventory period Accounts payable period Cash Size LN sales (sales/ previous year sales) – 1 (Short-term Debt + Long-term Debt)/total assets Current assets/Current liabilities Gross Domestic Product growth	+ + + + - + + - - -
Kusuma and Bachtiar (2018)	Indonesia	Study the relations between WCM and company performance	270	ROA CCC Accounts payable period Liabilities / Total Assets Size LN sales Current assets/Current liabilities	- - - - + -
Simon et al. (2018)	Nigeria	The quadratic relation between WCM and business performance	75	ROA ROE CCC CCC ² LN sales (sales/ previous year sales) – 1 Financial debt to total assets	- - - + + - + - +

2.9 CONCLUSION

In this chapter the intricate relation between profitability and working capital framed by extant literature was examined. Several independent and dependent variables were discussed. Moreover, a comparison of potential regressors revealed that authors have extensively explained the relation between working capital management and profitability by identifying specific explanatory variables: receivables period, inventory period, payables period and cash conversion cycle (Deloof, 2003), net trade cycle (Shin and Soenen, 1998). These might help explain profitability through the lens of ROA, ROE, ROS, GOP and WCSales. Upon closer examination of the extant literature's regressands, return on assets was identified as a key metric shared by Enqvist et al. (2014) and Tauringana and Afrifa (2013), whereas Deloof (2003),

Lazaridis and Tryfonidis (2006), Nobanee and AlHajjar (2014) used CCC as an independent variable followed by control variables. In addition, other explanatory variables, such as receivables period, inventory period, and payables period are included in cash conversion efficiency. Either those exogenous variables or cash conversion efficiency should be included in the regression; to avoid multicollinearity.

In the methodology chapter, the process and analysis of quantitative and qualitative data is fully described. Eight hypotheses are defined and explained for the quantitative analysis. The investigative approach is discussed and justified, including ontological and epistemological issues in relation to the aim, objectives and methods employed for the study.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter depicts the methodology used in the procedure of collecting, examining and exhibiting data. Researcher's data are the main input in the investigation process. The investigation approach and methods employed in this research are presented, as well as the rationalisation for the selected approach. The quantitative segment of the investigation uses data provided by the Superintendence of Companies (2016). This is a government entity controlling all formal companies from the real sector. This data set initially comprised 210,792 observations from 2000 until 2006, from which data about 46 corporations from the real sector were selected. The financial econometric methods used are described in this chapter as well as the variables used in developing the hypothesis about profitability and working capital.

3.2 DATA DESCRIPTION AND QUANTITATIVE ANALYSIS

The firms subject to data analysis can be categorised under the Superintendence of Companies (SIC) taxonomy, which contains fifteen segments in total (Table 2). Given that a key objective of this research was to provide useable information for a company operating in the Ecuadorian economy (Cronos), the study focused on firms with a similar business profile. The sample was comprised of companies which, firstly, belonged to the corporate sector (see section 3.4 for clarification of the taxonomy for company size), and secondly, were performing siderurgical activities, which fall into segment G in table 2. These represent 46 businesses operating in the real sector of the economy, in manufacturing, wholesale or as intermediaries in the siderurgical industry.

The SIC is a government entity which requires businesses to submit income statements, balance sheets and cash flow for regulation and supervision of reported figures. Financial services including commercial and investment banking, insurance and thrift companies were beyond the scope of this investigation since their protocols and accounting regulation are different to non-financial firms. Furthermore, working capital management of financial enterprises are diametrically different from the real sector (Falope and Ajilore, 2009). Therefore, the SIC does not monitor these firms. In accordance with Ecuadorian law, firms from the real sector must submit income statement, balance sheet and cash flow to the SIC.

To provide authenticity of company data, firms with missing or zero data were removed. However, firms with negative metrics were kept. Additionally, since this research utilized financial econometrics, it implemented data winsorisation⁶ with α of 1%; to remove outliers. These may provoke data distortions within the regression; thus the removal provides robust results (Aktas et al., 2015; Hill et al., 2010; Kieschnick et al., 2013). The research used SIC regulated firms, it covered the period from 2000 until 2006 during which an average of 30,113 companies (Table 2) were reported.

Table 2 shows the companies from this period according to SIC taxonomy. The data provided by SIC includes the balance of accounts from both income statement and balance sheet; I calculated the financial ratios.

Table 2. Companies classified by industry.

Source: Adapted from Superintendence of Companies.

Industries	Number of companies	%
(A) Agriculture	1,230	4,08%
(B) Mines and quarries	568	1,89%
(C) Manufacturing	10,224	33,95%
(D) Electricity, gas, steam and air conditioning supplies	995	3,30%
(E) Water distribution, sewage, waste management and sanitation activities	2,021	6,71%
(F) Construction	593	1,97%

⁶ Variables mean plus and minus three times standard deviation were deleted. Deleting one observation from the sample implies that all associated information must be removed as well.

(G) Production, wholesale and retail, repair of vehicles and motorcycles.	329	1,09%
(H) Transportation and warehousing	1,258	4,18%
(I) Accommodation and food services	2,350	7,80%
(J) Information and communication.	1,278	4,24%
(K) Financial and insurance activities	1,289	4,28%
(L) Real estate activities	1,689	5,61%
(M) Professional, scientific and technical activities.	1,254	4,16%
(N) Administrative and support service activities	4,512	14,98%
(Q) Human health attention and social assistance activities	523	1,74%
TOTAL	30,113	100%

3.3 SAMPLE PERIOD AND MONETARY SYSTEM

The chosen period reflects an era of relative political and economic egalitarianism and freedom. The *trias politica* model epitomised in executive, legislative and judiciary branches (checks and balances) dominated the political sphere, fostering democracy and equality in the Ecuadorian environment. Positive international relations opened the country to the world, embracing and fostering adequate conditions for foreign direct investment. Healthy political relations with its main trading partners (the U.S.A. and the E.U.) permitted Ecuador to trade and to finance the economy. The media and broadcasting industry was allowed to freely express news and to discuss political events. The financial system allowed money to be sent and received internationally, as well as the provisions of loans to customers with few restrictions. Businesses importing goods experienced an expansion as tariffs and quotas were lower. Concordantly, governments in this period allowed markets to determine the need for products and services based on customer and business demand. The administration from 2007 on was marked by an antagonistic anti-democratic and anti-capitalist stance. Part of the governmental strategy was to twist and alter data for political means. This creates a distortion on the accuracy, truthfulness and

unbiased nature of the information available for quantitative analysis, therefore data from this period was not considered.

The selected sample occurs when the country implemented a new monetary system. Throughout 1998 and 1999, government inefficiency and exogenous factors caused systematic and macroeconomic mismanagement. During 1998, the banking crisis obliterated fifty percent of depository institutions. Lack of trust and a weakened financial system led investors and businesses to send their financial resources overseas, prompting an unstoppable increase in the exchange rate that led to the declaration of a non-statutory bank holiday in March 1999, whereupon deposits were frozen. Ecuador's inflow of dollars was in peril due to several factors adversely affecting exports, and thus the balance of payments. Natural disasters like *El Niño* affected the production of the banana industry, while a life-threatening disease known as white spot syndrome caused the depletion of shrimp numbers. In 1999, GDP was -7%, inflation 52%, local currency lost 195% of its value, unemployment was 66%, and businesses reported losses totalling 8 billion U.S. dollars. Governmental authorities realized that the inflationary process in the local currency (Sucre) was out of control. No moderate measure could check this process and so, as a last resort, an executive order to change the economic system was issued. Ecuador adopted the U.S. dollar as its new medium of exchange, effective from the 9th January 2000.

After a period of adaption in the year 2000, dollarization did help stabilise to the inflation rate, which permitted firms to adequately develop consistent and realistic business and finance plans, especially in the areas of buying raw materials and/or finished products, affecting short-term management of inventories. In addition, economic stability provided a clear and stable horizon for customers looking to buy on credit, affecting accounts receivables. Finally, suppliers were able to have more confidence that payments would be made over time, affecting accounts payables.

3.4 INSTITUTIONAL TAXONOMY AND CRITERIA FOR RESEARCH

Resolution number SC.ICI.CPAIFRS.G.11.010 of the SIC (Manssur, 2011) defines firm size in terms of sales in U.S. dollars. For a company to be considered small it must have sales of less than \$1,000,000; whereas medium companies sell between \$1,000,001 and \$2,000,000, and large companies between \$2,000,001 and \$5,000,000. This taxonomy drew on Decision 702 in the communal statistical program of the Andean Community of Nations (2008). To elaborate and publish financial statements (Income statement, balance sheet and cash flow) aforementioned entities in Ecuador must comply with the International Financial Reporting Standards (IFRS). Lucrative firms selling more than \$5,000,000 are considered corporations and must also abide by the corresponding IFRS requirements. The International

Standard Industrial Classification –ISIC- (United Nations, 2018), which provides general standards for taxonomy of productive economic activities, is used by SIC, as it provides categories used for statistics according to activity. To perform a fair and consistent financial econometrical analysis the investigation filtered data exclusively from siderurgical firms. Within this industry the research considered firms with a similar profile to that of Cronos, the company under scrutiny. Therefore, the investigation carefully focussed on 46 corporate firms with sales greater than \$5,000,000. These companies belonged to segment C2410 “manufacturing of iron and steel” according to the ISIC.

3.5 PANEL DATA

This investigation used panel data: an econometrical method that gathers cross-sectional observations over multiple time periods. It provides robust results as it controls for heterogeneity which biases results (Wooldridge, 2005), eliminates omitted variables anomalies and decreases the probabilities of multicollinearity. Baños-Caballero et al. (2012) commented that panel data circumvents unobservable heterogeneity, since it is always difficult to identify firm-specific characteristics which may influence profitability and potential endogeneity. The observed relation between performance and company characteristics might show “not only the effect of exogenous variables on firm performance, but also the effect of corporate performance on those variables” (Baños-Caballero et al., 2013). In addition, since this method provides more degrees of freedom, it can provide estimators that are more reliable. It was applied in this study to estimate profitability (Y_{it}) following companies (i) using financial ratios (X_t) over the seven years (t) of data, considering a residual (u) as depicted in equation (1):

$$Y_{it} = \alpha_i + \beta_1 X_{it} + \dots + \beta_i X_{it} + u_{it} \quad (1)$$

Where:

Y_{it} = dependent variable.

α_i = is the intercept for each entity ($i = 1 \dots n$)

β_i = coefficients of X_i at time “ t ”

X_{it} = independent variable at time “ t ”

u = residual term

i = entity from 1.... N

t = years from 1.... T

The investigation used unbalanced panel data since company data provided by the SIC varies from year to year. This occurs because new companies are formed while others go bankrupt. Additionally, the amalgamation of cross-section and time-series observations in panel data may considerably augment the number of observations; this is principally relevant for the research of working capital management and profitability.

Cross sectional and time series studies may report biased results due to lack of control for heterogeneity; Wooldridge (2005) adds that an omitted variable (or unobserved heterogeneity) does not change over time and panel data with fixed effects control for this abnormality (Pedroni, 2001). Moreover, panel data provide more variability, less multicollinearity, more degrees of freedom, and greater efficiency. If there is correlation (fixed effects) between unseen heterogeneity (the particular characteristics of each firm) and independent variables, it is possible to have consistent estimators (within-the group). In contrast, random effects may provide estimators using generalized least squares (GLS). To ascertain which method ought to be employed, the Hausman test⁷ is strongly recommended (García-Teruel and Martínez-Solano, 2007).

3.5.1 WORKING CAPITAL VARIABLES

Extant literature explains financial management axioms through quantitative metrics. These are expressed specifically using financial ratios. High impact modern working capital research has been conducted by a myriad of researchers. In America these include Aktas et al. (2015), Filbeck et al. (2007), Gill et al. (2010), Kieschnick, et al. (2013), Nobanee and AlHajjar (2014) and Shin and Soenen (1998). In Europe these include Baños-Caballero et al. (2013), Deloof (2003), Enqvist et al. (2014), García-Teruel and Martínez-Solano (2007), Lazaridis and Tryfonidis (2006), Sen and Oruc (2009), Tauringana and Afrifa (2013). In South America these include De Almeida and Eid (2014) who investigated working capital management. This topic has been investigated in other developing countries such as Pakistan by Haq et al. (2011), Nigeria by Nwankwo and Osho (2010), India by Singhania et al. (2014) and Iran by Alavinasab and Davoudi (2013).

Interestingly not all authors agree on the regressand and regressors and their direction and magnitude. Inconsistencies arise due to four factors: 1. The observations come from different years and therefore different economic national output (expansion vs. recession) rendering alternative results. 2. Dissimilar

⁷ $H_0: E(\eta_i / x_{it}) = 0$. If H_0 is rejected then fixed effects with OLS will be used. However, if H_0 is failed to be rejected then random effects are used using GLS.

accounting regulations (US GAAP, UK GAAP, Canada GAAP) account for different technical criteria according to the legislation and accounting protocols. 3. Authors' techniques to analyse financial information and econometric data (cross sectional vs. panel data regression) may vary rendering different outcomes. 4. Sampling size varies according to availability and quality of information.

3.5.1.1 THE DEPENDENT VARIABLE

Several financial measures of profitability have been analysed to represent the dependent variable measuring profitability. The research of Aktas et al. (2015), studied 15,541 American firms using the stock return attuned for company size and market to book as a metric of stock performance. Also, they used return on assets as measure of operating performance. American companies were investigated as well by Kieschnick et al. (2013) focusing on stock excess return over a benchmark of stock return. The latter is the return of size and book to market sorted portfolio for which the company belongs. Following Aktas et al. (2015) and Kieschnick et al. (2013), De Almeida and Eid (2014) used stock's excess return as the predicted variable. However, they concentrated on Fama and French's (1993) construction of twenty-five benchmark portfolios using company size (small minus big) and Book /Market ratio (high minus low). Similar to Aktas et al. (2015), Filbeck et al. (2007) used annual returns of companies; this frequency eliminates summing daily and monthly returns which in turns render a biased metric. Shin and Soenen (1998) take one step backward on company performance measurement as they considered operating income + depreciation / net sales, operating income + depreciation / total assets (Table 3) instead of net income adjusting this profitability measures for risk using Treynor Index and Jensen's Alpha.

Baños-Caballero et al. (2013) and Nobanee and AlHajjar (2014) combined econometrics and financial tools; the former used corporate performance (Q) this metric mitigates many of the drawbacks related to accounting ratios, due to accounting practices, regulations and capital market appraisals. It also considers company risks. Nobanee and AlHajjar (2014) innovate as well since their approach used first difference of operating income to sales to measure the impact of working capital using cash conversion cycle and net trade cycle.

A simpler approach was used by Gill et al. (2010) they used gross operating profit (GOP) instead of earnings before interest taxes (or earnings before interest taxes depreciation and amortisation) over assets; because they wanted to observe the relation of cash conversion cycle with gross margin. Interestingly, GOP does not consider financial assets; authors use it because they want to isolate financial

from operational activity. Likewise, Deloof (2003) used traditional financial ratios gross operating income (GOI) and net operating income (NOI). Authors mentioned that using GOI over return on assets allows them to isolate the effect of financial assets (shares in other companies, intended to contribute to the earnings of the business holding them) to measure profitability. Following Deloof (2003)'s methodology Lazaridis and Tryfonidis (2006) used GOP instead of earnings before interest taxes depreciation and amortisation (EBITDA) since they wanted to relate a firm's success with an operational ratio. Concordantly, they excluded financial assets return on assets (ROA) for the same reason as Deloof (2003). Contrary to the previous authors, García-Teruel and Martínez-Solano (2007) and Sen and Oruc (2009) used ROA because they believe this metric is a measure of general business performance. Tauringana and Afrifa (2013) agree with Sen and Oruc (2009) as they used ROA. Authors found a relevant and negative correlation between ROA and accounts receivable period, accounts payable period. Enqvist et al. (2014) follow a similar metric using ROA, but unlike the previous he considers GOI too. The former is a proxy for firm overall profitability; that does neither focuses on exact accounts nor recognises capital structure. Furthermore, for Enqvist et al. (2014) GOI measure specifically operational performance success (or failure) of companies.

In contemporary academic literature, it is observed that ROA defined as net income / total assets is commonly used. Altaf and Shah (2017) and Moussa, (2018) reported two equations, where they used two company performance measures: ROA and Tobin's Q, as regressands (as described in Table 3). Moreover, the investigation of Moussa (2018) indicated that lagged ROA_{t-1} was positively related with business performance (ROA) in the previous year (α 1% significance level). The aforementioned authors also found that there is a positive relation between company value and lagged endogenous variable (Tobin- Q_{t-1}), implying a close relation between company performance and past firm value divided by asset replacement cost. Similar to previous studies the study of Simon et al. (2018) used ROA, but also introduced ROE. Although, there were wide fluctuations in mean value, in this case authors reported that both metrics had a negative relation with CCC, whereas CCC^2 showed a positive relation with regressands.

Kusuma and Bachtiar (2018) also used ROA and reported that it had a negative relation with CCC, accounts payable period and current ratio. To provide accurate perception and robustness, Madhou et al. (2015) used three different endogenous variables to describe the aforementioned relationship. The variables were: net profit (NP), which depicts the most frequent metric of accounting profit, economic

value added (EVA), which is commonly used as a measure of economic profit for US and Canadian executives, and ROA.

The importance of working capital management and its components is recognized not only by academics but by practitioners as well. Ramiah et al., (2014) performed two investigations into working capital management in Australian firms. The authors surveyed corporate treasurers, and their research revealed that for managers and treasurers, WCM components are considered pivotal elements affecting profitability, along with size, industry, foreign sales, debt and risk. However, these managerial elements are susceptible to change during times of despair and uncertainty. The global financial crisis of 2008 profoundly changed decision-making policies regarding WCM in the firms under scrutiny. Cash was kept in the four largest banks to avoid losses in the event of bank failure, and tightening of credit supply occurred as the by-product of an analysis of customer credit worthiness. Concordantly, inventories decrease as they move in tandem with receivables; these steps improved forecasting and control systems. As part of the changes initiated, both OPEX and CAPEX were diminished. The former were restricted to comply with necessary operational needs, while a retrenchment in capital expenditures occurred as long term acquisitions were also kept at low levels. Both measures were intended to aid the long-term sustainability of firms.

The authors also reported that in Australia, WCM is influenced by the behavioural biases of managers, such as high confidence, self-absorption, risk aversion and anchoring. Although these traits are not necessarily wrong per se, they have an influence in financial managerial decision-making. For instance, if a firm wanted to adopt a conservative risk position, the firm should hire a manager with a self-serving bias. This proved to be effective during times of crisis such as the recession during 2008 and 2009. The same authors noted that during this crisis, liquidity and risk management had to be restructured to counterbalance the effects of the crisis. Policy changes included, but were not limited to: reducing credit supply and accounts receivables in order to preserve liquidity; limiting inventory acquisitions to necessary levels; no idle acquisitions. These measures aimed to reduce CCC whilst preserve cash and reducing debt.

Table 3. Dependent variable.

Author	Description
Aktas et al. (2015)	Performance is the excess return stock adjusted for market to book and company size. Aktas et al. (2015) also used one year return on assets = Operating income before depreciation divided by total assets
Kieschnick, et al. (2013)	Equation represents stock's excess return r_{it} = return of company stock during year "t" R_{t}^B = benchmark return of stock
Gill et al. (2010)	1. Gross operating profit = (Sales-COGS) / (Total assets-financial assets)
Filbeck et al. (2007)	1. $BHAR_{it}$ is the annual return of companies defined as the average buy and hold return
Shin and Soenen (1998)	1. IS = (operating income + depreciation / net sales) 2. IA = (operating income + depreciation / total assets) 3. TI = Treynor Index 4. Jensen's Alpha
Nobanee and AlHajjar (2014)	1. First difference earnings before interest and taxes divided by sales
Deloof (2003)	1. Gross operating income = Sales minus cash cost of goods sold divided by total assets minus financial assets. 2. Net Operating Income = Sales minus cash <i>and non-cash</i> cost of goods sold divided by total assets minus financial assets.
Lazaridis and Tryfonidis (2006)	1. Gross operating profit = (Sales – COGS) / (Total assets – financial assets)
Sen and Oruc (2009)	1. Return on total assets = Net term profit / Total assets
Tauringana and Afrifa (2013)	1. Return on assets = Profit before interest and taxes / Total assets
Baños-Caballero et al. (2013)	1. Q represents corporate performance, the ratio of the sum of market value of equity and book value of debt / book value of assets.
Enqvist et al. (2014)	1. Return on assets = Net income divided by total assets 2. Gross operating income = Sales (adjusted for cost of goods sold) divided by Total assets minus financial assets
De Almeida and Eid (2014)	Equation represents stock's excess return r_{it} is the return of stock i on year t.

García-Teruel and Martínez-	Return on total assets = Earnings before interest and tax/ Total assets
Altaf and Shah (2017) Moussa, (2018)	Return on total assets = Net income (after taxes) / Total assets Tobin's Q defined as equity market value + debt book value divided by asset book value
Madhou et al. (2015)	Net profit, economic value added and ROA.
Kusuma and Bachtiar (2018)	Return on total assets = Net income (after taxes) / Total assets
Simon et al. (2018)	Return on total assets = Net income (after taxes) / Total assets Return on total equity = Net income (after taxes) / Total equity

3.5.1.2 THE INDEPENDENT VARIABLES

Exogenous variables depicting working capital management components explain company profitability. However, differences in data, accounting protocols and researcher criteria render a unique perspective on the financial ratios utilized. The seminal works in this area are listed in table 4 along with the various independent variables used in each case.

Aktas et al. (2015) used net working capital/ sales as the variable of interest to measure company performance and investment along with a dummy for excess NWC (positive) and zero otherwise. Similarly, Kieschnick, et al. (2013) used NWC, cash holdings, interest expense, total dividends, total debt / (total debt + equity market value), equity issuance minus repurchases plus debt issuance minus redemption, earnings before interests, total assets except cash and research and development. Those authors were particularly interested in the effect of net working capital and NWC_{t-1} on stockholder's wealth.

Gill et al. (2010) used a different approach using cash conversion cycle (CCC) and its components, controlling for firm size, financial debt ratio, and fixed financial asset ratio. The authors partially corroborate extant literature on the reduction of accounts receivable to enhance company profitability. However, they argue that CCC has a positive relation with GOP; which contradicts the inverse CCC and profitability relation. The components of CCC are listed in table 5. Similarly, Filbeck et al. (2007) used cash conversion efficiency (CCE) and days of working capital to assess whether managers' working

capital policies are relevant for company evaluation and stockholder wealth maximisation. In their research CCE is positively related with company returns suggesting that shareholders recognize the worth of WCM. Similar metrics were used by Shin and Soenen (1998), namely current ratio, sales growth, debt ratio, CCC and net trade cycle (NTC). The authors wanted to test whether efficiency of WC increases company profitability. They claimed that NTC is more efficient than CCC since dividing by sales provides the number of “day sales” firms require in order to finance their working capital.

On the other hand, Nobanee and AlHajjar (2014) used differenced lagged first difference of earnings before interest and taxes/sales⁸, first difference of accounts receivable period (ARP), inventory periods (IP), payables period (PP), CCC, net trade cycle (NTC) and operating cycle (OC) (Table 4). They also used control variables like sales growth (SG) and total/equity (TD/D). Furthermore, the liquidity and profitability relationship was tested through the quick ratio. They found that shortening CCC and NTC improves OI/Sales. Additionally, the lagged OI/S revealed that firm performance in the present is linked to company performance from the previous period. Additionally, within the realm of WC research it is feasible to use the lagged dependent variable as an independent variable. For instance, Nobanee and Abraham (2015) used current assets / total assets (CATA) as dependent variable, and the difference lagged of $CATA_{it-1}$ as exogenous variable. In addition, they used the first difference of NTC, and as control variables, they used sales growth and long-term debt to equity ratio. The authors conclude that there is a negative relation between NTC and companies' liquidity. In addition, firms improve their liquidity by decreasing their NTC.

Unlike Nobanee and Abraham's (2015) lagged variables, Deloof (2003) considered ARP, IP, PP in days and CCC in days. He used size, sales growth, financial debt ratio, fixed financial assets ratio and variability as control variables. Deloof (2003) found a negative relation between GOI and working capital management components. Lazaridis and Tryfonidis (2006) also contemplated CCC controlling for size, fixed financial assets ratio and financial debt ratio. They tested CCC and its components to understand how management efficiency enhances company profitability. They also assessed the influence and impact of external financing in terms of company assets similar to Deloof (2003). However, unlike previous authors Lazaridis and Tryfonidis (2006) used financial assets as regressor.

⁸ For the author first difference of earnings before interest and taxes is OI, he used as a regressor the lagged variable $OI/sales_{t-1}$ of the dependent variable OI/sales

Sen and Oruc (2009) developed two models which both used return on total assets with different regressors depicted in Table 4. They claimed that to increase profitability and market value of a company; businesses must adequately manage CCC components by reinforcing funding resources and decreasing the amount allocated to current assets. Analogously, Nobanee (2014), Tauringana and Afrifa (2013) used ARP, IP, PP, CCC. Their control variables were Quick ratio (QR), Inventory / Current assets (INV/CA), Current assets / total assets (CA/TA), Fixed assets / total assets (FA/TA), Total debt / total assets (LEV) and logarithm of total assets (TALOG) (Table 4). They investigated small medium enterprises (SMEs) in the UK using CCC and its components against ROA, and found that ARP and PP outstand from the regressors. Furthermore, PP was found to be relatively more important than ARP.

Baños-Caballero et al. (2013) coincide with Shin and Nobanee on the use of net trade cycle (NTC), NTC^2 . They controlled for size, LEV, growth, return on assets and a dummy variable capturing the effect of economic variables (λ). They used NTC as dynamic metric of liquidity providing an estimate of financing requirements (regarding working capital), noting that NTC avoids the shortcomings of overwhelming simplicity of current ratio (CR) and quick ratio. As instruments they lagged independent variables (up to 4 times).

As with Tauringana and Afrifa, and Lazaridis and Tryfonidis, Enqvist et al. (2014) used CCC, a recession dummy variable (D1), expansion dummy variable (D2); they controlled for size, CR, and debt ratio. CCC is considered as an operational measure of working capital management (WCM). This is beneficial as it acknowledges the expectancy of working capital components; considering the fact that supply chain process and receivables are lagged procedures requiring time (for cash conversion). Interestingly, Enqvist et al. (2014) incorporates D1 and D2 to acknowledge for macro-economic changes affecting (WCM).

De Almeida and Eid (2014) used cash of company i on year t and its lagged variable, EBIT, total assets except cash, financial expenses, dividends paid, long term liabilities divided by market value of the company, and the value of issued and repurchase shares plus the amount of issue and redemption of debt. The model intends to assess the changes in market value related with changes in WCM, controlling for factors associated to variations in WCM which may interfere in firm market value. All exogenous variables except for lever were deflated by a firm's lagged market value. This means the outcome can be understood as the rise in market value related with monetary variation for the independent variable.

García-Teruel and Martínez-Solano (2007) considered traditional short term resource accounts to elucidate profitability, including number of days of receivable, inventory, payables and CCC. These were controlled for size, sales growth and leverage. To avoid endogeneity, instruments used included the first lag of ARP, IP, PP and CCC. The authors also discussed the effects of increasing or decreasing control variables and their effect on aggressive or conservative WCM policies on profitability of SMEs.

Altaf and Shah (2017) used both cash conversion cycle and CCC² to ascertain working capital management (WCM). The latter examined the non-linear relation between CCC and ROA. To avoid omitted variables, size, growth, tangibility, age, leverage and current ratio were used as control variables. Their outcome confirms the findings reported by Baños-Caballero et al. (2012) following their investigation in Spain, revealing an inverted U-shape relation between CCC and the regressand. This relation is framed by a trade-off where firm performance increases with WC investment at low levels, reaches an inflection point and then decreases at high levels.

To test WCM, Kusuma and Bachtiar (2018) used cash, CCC, inventory, payables period, current ratio and net working capital. CCC showed a negative relation with business performance, indicating that smaller WC increases profitability, in line with Afrifa, (2015); Garcia-Teruel and Martinez-Solano, (2007); and Nobanee et al. (2011). Moussa, (2018) employed similar regressors to Kusuma and Bachtiar (2018). However, to avoid correlational issues among ROA and other variables, they utilised ROA lagged as an additional independent variable. Unlike previous studies, Moussa, (2018) found a positive relation between CCC and ROA, implying that companies with high performance have sufficient working capital resources, which consequently entails a longer CCC.

The research of Madhou et al. (2015) utilised three different exogenous variables, which changed according to the regressor. The investigation revealed that size and debt ratio along with cash are determinants for firms with working capital surplus and deficit. Interestingly, in firms with working capital deficit, payables period had a negative coefficient with ROA, whereas extreme portfolio iterations show that in companies with the best WC surplus or worst WC deficit, there was a negative relation between debt and ROA. Thus far, the studies reviewed assumed the relation between WCM and profitability was linear. Simon et al. (2018) have contested this linearity. In their research, they used residual absolute values to regress ROA and ROE. The negative relation between business performance and the quadratic relation of working capital. reveals that deviation from optimal levels of WCM influences company profitability in a negative manner. This indicates that the relation between WC and

company profitability is not linear but quadratic instead, which in turn implies that either a low or a high investment in WC strongly influences company performance.

Baños-Caballero et al. (2013), De Almeida and Eid (2014), Filbeck et al., (2007), Gill et al. (2010), Kieschnick, et al. (2013), Lazaridis and Tryfonidis (2006), and Tauringana and Afrifa (2013), used variance inflation factor (VIF) to corroborate the absence of multicollinearity. These findings indicate that the correlation among independent variables is not high and therefore will not affect research outcomes.

Given the vast number of plausible variables suggested in the extant literature and mentioned in Table 4, this study ran several iterations and selected those variables that were statistically significant. In other words, the P-value in the T-test was $< \alpha$. Part of the work of the action research set was to analyse and discuss the statistically significant variables found in the investigation.

Table 4. Independent variables and control variables.

Author	Description
Aktas et al. (2015)	<i>1. Independent variables</i>
	1.1 Net working capital divided by sales
	1.2. Net working capital previous period
	1.3. Dummy variable, 1 for excess net working capital 0 otherwise
	<i>2. Control variables</i>
	2.1 Size is the market value of equity
	2.2 Represents cash and equivalents of cash
	2.3 Cash flow is operating income before extraordinary items plus depreciation scaled by lagged fixed assets
	2.4 Leverage = Total debt divided by total assets
	2.5 Book to market = Book value of equity divided by market value of equity
	2.6 Financial distress = Dummy variable 1 for company experience hardship meeting its financial expense and it is overleveraged. 0 for business meeting its financial obligations timely [1].
	2.7 Standard deviation of company sales
	2.8 Sales growth = $(\text{Sales}_t - \text{Sales}_{t-1}) / \text{Sales}_{t-1}$

[1] A company is considered under financial distress when operating income before depreciation divided interest expense is below 0.80 (Aktas et al., 2015).

Kieschnick, et al. (2013)	<p><i>1. Independent variables</i></p> <p>1.1 $C_{(t)}$ = Cash holdings</p> <p>1.2 $I_{(t)}$ = Interest expense</p> <p>1.3 $D_{(t)}$ = Total dividends</p> <p>1.4 $L_{(t)}$ = Total debt / (Total debt + equity market value)</p> <p>1.5 $NF_{(t)}$ = Equity issuance minus repurchases plus debt issuance minus redemption</p> <p>1.6 $E_{(t)}$ = Earnings before interests</p> <p>1.7 $NA_{(t)}$ = Total assets except cash</p> <p>1.8 $RD_{(t)}$ = Research and development</p> <p>1.9 Net working capital = Accounts receivable + inventory – accounts payable</p> <p><i>2. Control variables</i></p> <p>2.1 Accounts receivable period</p> <p>2.2 Inventory period</p> <p>2.3 Accounts payable period</p>
Gill et al. (2010)	<p><i>1. Independent variables</i></p> <p>1.1 ARP See Table 5</p> <p>1.2 Logarithm of sales lagged one period</p> <p>1.3 Short term plus long term loans divided by total assets</p> <p>1.4 Fixed financial assets divided by total assets</p> <p><i>2. Control variables</i></p> <p>2.1 Natural logarithm of sales</p> <p>2.2 Financial debt ratio = (Short-term loans + Long-term loans) / Total assets</p> <p>2.3 Fixed financial asset ratio = Fixed financial assets / Total assets</p>

Filbeck et al. (2007)	<p><i>1. Independent variables</i></p> <p>1.1. Cash conversion efficiency = operating cash flow divided by sales</p> <p>1.2. Days of working capital = (Receivables + inventory – payables) / average daily sales</p> <p><i>2. Control variable</i></p> <p>2.1 Size is measured with sales</p>
Shin and Soenen (1998)	<p><i>1. Independent variables</i></p> <p>1.1 Current ratio = Current assets / current liabilities</p> <p>1.2 Sales growth = (Sales_t / sales_{t-1}) - 1</p> <p>1.3 Debt ratio = Total debt / total assets</p> <p>1.4 Net trade cycle = (Inventory / sales + accounts receivable / sales – accounts payable / sales) * 365</p>
Nobanee and AlHajjar (2014)	<p><i>1. Independent variables</i></p> <p>1.1. OI_{t-1} is the differenced lagged operating income divided by sales</p> <p>1.1 Operating income is earnings before interest and taxes divided by sales</p> <p>1.2. First difference of:</p> <p><i>Variables on Table 5</i></p> <p>1.2.3. NCC = Net trade cycle</p> <p>Net trade cycle = (Receivable collection period / sales) * 365 + (Inventory collection period / sales) * 365 – (Payable deferral period / sales) * 365</p> <p>1.2.4. Operating cycle = Receivable collection period + inventory collection</p> <p><i>2. Control variables</i></p> <p>2.1 Sales growth = (Sales_t – sales_{t-1}) / sales_{t-1}</p> <p>2.2 TD/D = Total debt / equity</p> <p>2.3 Quick ratio = (Current assets - inventory) / current liabilities</p>
Deloof (2003)	<p><i>1. Independent variables</i></p> <p>1. See Table 5</p> <p>2. Size is natural logarithm of sales</p> <p>3. Sales growth = (Sales_t / sales_{t-1}) - 1</p> <p>4. Financial debt = Financial debt / total assets</p> <p><i>2. Control variables</i></p> <p>1. Fixed financial assets ratio = Fixed financial assets / total assets</p> <p>2. Variability is σ of net operating income defined as: (Sales – cash and non-cash cost of goods sold)</p>
Lazaridis and Tryfonidis (2006)	<p><i>1. Independent variables</i></p> <p>1.1. See Table 5</p> <p>1.2. Natural logarithm of sales</p> <p>1.3. Fixed financial assets ratio = Fixed financial assets / Total assets</p> <p>1.4. Financial debt ratio = (Short term loans + Long term loans) / Total assets</p>

Sen and Oruc (2009)	<p><i>1.Independent variables</i></p> <p>1.1Model 1.</p> <p>1. <i>See Table 5</i></p> <p>2. Daily working capital = (Receivables + inventory)-liabilities /daily sales</p> <p>3. Current ratio = Current assets / current liabilities</p> <p>4. Net working capital level = (Current assets – current liabilities) / Total assets</p> <p>1.2 Model 2.</p> <p><i>See Table 5</i></p> <p>5.NWCL is Current assets – current liabilities / Total assets</p>
Tauringana and Afrifa (2013)	<p><i>1.Independent variables</i></p> <p>1. <i>See Table 5</i></p> <p>2. <i>Control variables</i></p> <p>2.1 Quick ratio = (Current assets-inventory) / Current liabilities</p> <p>2.2 INV/CA = Inventory / Current assets</p> <p>2.3 CA/TA = Current assets / total assets</p> <p>2.4 FA/TA = Fixed assets / total assets</p> <p>2.5 LEV = Total debt / total assets</p> <p>2.6 Size is logarithm of total assets</p>
Baños-Caballero et al. (2013)	<p><i>1.Independent Variables</i></p> <p>1.1.Net trade cycle = (Accounts receivables /sales * 365) + (Inventory / sales *365) – (Accounts payables / sales *365)</p> <p>1.2. Net trade cycle squared</p> <p>1.3. λ (Lambda) is a dummy variable capturing the effect of economic variables; which may affect company performance.</p> <p>2. <i>Control variables</i></p> <p>2.1. Size is natural logarithm of sales</p> <p>2.2. LEV = Total debt / Total assets</p> <p>2.3. Growth is (book value of intangible assets / total assets)</p> <p>2.4. ROA = Earnings before interest and taxes / Total assets</p>
Enqvist et al. (2014)	<p><i>1.Independent variables</i></p> <p>1.1.1 <i>See Table 5</i></p> <p>1.1.2 D1 Recession dummy variable</p> <p>1.1.3 D2 Expansion dummy variable</p> <p><i>1.2Control Variables</i></p> <p>1.2.1 Size is natural logarithm of sales</p> <p>1.2.2 Current ratio = Current assets divided by current liabilities</p> <p>1.2.3 Debt ratio = (short term loans plus long term loans) / Total assets</p>

De Almeida and Eid (2014)	<p><i>1. Independent Variables</i></p> <p>1. C_{it} Cash of company i on year t.</p> <p>2. C_{it-1} lagged cash of company i on year t</p> <p>2. $EBIT_{it}$ Earnings before interest taxes</p> <p>3. Na_{it} Total assets minus cash</p> <p>4. $Inter_{it}$ Financial expenses</p> <p>5. $Divid_{it}$ Dividends paid</p> <p>6. $Lever_{it}$ Long term liabilities divided by market value of the company</p> <p>7. Nf_{it} The value of issued and repurchase shares plus the amount of issue and redemption of debt</p>
García-Teruel and Martínez-Solano (2007)	<p><i>1.1. Independent variables</i></p> <p><i>See Table 5</i></p> <p><i>2. Control variables</i></p> <p>2.1 Size is logarithm of assets</p> <p>2.2 Sales growth is $(Sales_t / sales_{t-1}) - 1$</p> <p>2.3 Leverage is debt divided by liabilities</p> <p>2.4 Annual gross domestic product growth</p>
Moussa, (2018)	<p>ROA_{t-1} (lagged one period)</p> <p>Cash conversion cycle (see table 5)</p> <p>Growth percentage change in sales over past year</p> <p>Age Natural logarithm of businesses' age</p> <p>Size Natural logarithm of total assets</p> <p>Leverage total debt divided by total assets</p> <p>GDP Yearly change in real GDP</p>
Altat and Shah (2017)	<p>Variables in table 5</p> <p>Cash conversion cycle²</p> <p>Firm size Natural log of total assets</p> <p>Growth $(Sales_t / sales_{t-1}) - 1$</p> <p>Tangibility Fixed financial assets/total assets</p> <p>Firm age. Number of years' company was founded</p> <p>Leverage total debt to total assets</p> <p>Current Ratio</p>
Madhou et al. (2015)	<p>ROA_{t-1} (lagged one period)</p> <p>Inventory $_{t-1}$ (lagged one period)</p> <p>Accounts payable period</p> <p>Accounts receivable period</p> <p>Cash</p> <p>Size Natural log of total assets</p> <p>Percentage change in sales</p> <p>Gross domestic product growth</p> <p>$(Short-term Debt + Long-term Debt)/total Assets$</p> <p>Current assets/Current liabilities</p>

Kusuma and Bachtiar (2018)	Variables in table 5 Size LN of Sales Total Liabilities/Total Asset Net Sales/(Current Assets – Current Liabilities) Current Liabilities/Current Asset
Simon et al. (2018)	Cash conversion cycle (see table 5) Cash conversion cycle ² Size LN of Sales (Sales _t / sales _{t-1}) - 1 Financial debt divided by total assets

Table 5. Cash conversion cycle components.

Variables	Description
CCC	Cash conversion cycle (days) = Accounts receivables (in days) + inventory (in days) + payable (in days)
ARP	Accounts receivables period (days) = Accounts receivables / Sales * 365
IP	Inventory period (days) = Inventory / Cost of goods sold * 365
PP	Payables period (days) = Accounts payables / Cost of goods sold * 365

Table 6. Summary of variables and hypothesized sign.

Hypothesis number	Variable	Acronym	Hypothesized sign
H1	Cash conversion cycle	CCC	-
H2	Debt ratio	Debt	-
H3	Fixed asset turnover	FAturn	+
H4	Times interest earned ratio	Timinter	+
H5	Logarithm of assets	Size	+
H6	Accounts receivable period	ARP	-
H7	Accounts payables period	PP	-
H8	Current assets divided by total assets	CATA	+

Table 6 summarizes the eight underlying hypothesis of the thesis based on the variable of interest, hypothesized control variables, firm indebtedness and their hypothetical direction.

3.6 CONTRASTING QUALITATIVE AND QUANTITATIVE METHODOLOGIES

Data collection for quantitative and qualitative systems is radically different; quantitative data is obtained from methods less susceptible to manipulation, whereas qualitative information is drawn from

human perspectives which tend to be more subjective. Nevertheless, for the very same reason this human context can help to make valuable inferences about the meaning and role of data. Qualitative information might come from several sources. For example, the study could be focused on 1) observations by a single researcher, 2) observations by multiple participants or respondents, 3) interviews, and 4) focus group discussions Chiu (2003). The qualitative research seeks to observe and understand individuals in their natural environment, by examining their standards, working practices and human relations. Often the researcher is the only tool for data gathering and study. This might entail some risks as the research may be prone towards influencing consciously or not investigation results. Moreover, researchers may use specific methodologies known to yield the expected or desired results; again this incorporates a human bias. The use of action research welcomes a multiplicity of disciplines, where different methods for information collection can be incorporated and changed along with the aim of the study (Chaiklin, 2011).

Mixed research methods is an approach associated with conjoining research techniques such as qualitative and quantitative. Hybrid methodology is employed under different circumstances; for example, quantitative methods might perceive reality in a particular point in time, whereas qualitative might uncover certain consistencies and aspects not previously disclosed by numerical figures. Also, qualitative methods may deliver relevant contextual information complementing the results of a quantitative data. Often a researcher cannot solely rely on a single methodology, and therefore seeks knowledge from other sources.

Therefore, due to the nature of this investigation, the thesis uses a trans-discipline *model two* (Gibbons et al., 2011) where the investigator is using information from several disciplines, combining action research with financial econometrics. A trans-disciplinary mode two contributes to the social research (Tranfield and Starkey, 1998) integrating the perspectives of professionals from several disciplines including international business, logistics, IT, accounting and finance in managerial positions. The socially-oriented discussion of action research by itself cannot properly elucidate the problem of a specific company because there are a myriad of financial variables, theories and potential actions which could be endlessly discussed with no meaningful final result.

Thus, the quantitative tools were used from the corporate segment to identify specific financial metrics in order to propose a solution to a problem experienced by a specific company, Cronos, with the aim of enhancing its organisational performance. This solution was then presented to the company, members

of whom formed the action research set. An action research process was enacted whereby the set reflected on the problem, examined the data, discussed the hypothesised results, reached decisions, took action and reflected on the results, thereby initiating another cycle. I collected data on this process using several of the aforementioned methods. The combination of methods therefore enabled the investigation to raise a quantitative foundation and, examine its application in the context of the current status quo of company management. For instance, qualitative information allowed me to obtain the perspective of Cronos collaborators whilst permitting me to explore explicit issues of organisational performance.

3.6.1 INVESTIGATOR STANCE AND SET MEMBERS' POSITION

For any investigation, it is primordial to determine what the stance of the researcher is. A dichotomy for the researcher arises as he can be perceived as insider or outsider (Greene, 2014). For Dwyer and Buckle (2009) an insider researcher is part of the population under scrutiny and has a better perspective of the population because he or she shares the same linguistic skills and culture as research participants. This permits researchers to have more acceptance and easier access to participants' data. In contrast, outsiders are perceived as agents with a high level of subjectivity, who might not be able to fully understand the view of participants, due to a lack of shared context, culture, or experiences. For Anderson and Jones (2000), the researcher may have itinerant and dynamic positions, implying that his or her position is determined by the relationship with set members, the institution, context and investigator's mind set, which according to Dwyer and Buckle (2009) may lie between insider and outsider. The ontological and epistemological perspectives will also determine the researcher's stance, which may be different in any given position. For Anderson and Jones (2000) the researcher as an insider consultant may have three different approaches 1) collaborate with the researcher in his own practice, 2) collaborate with other insiders, or 3) participate along with outsiders. The outsider stance also entails three alternatives, represented by 1) mutual collaboration of insider–outsider groups, 2) the outsider participation with an insider and 3) outsider investigates insider. All the positions mentioned have a key element in common; they are interested in the knowledge base, to augment and contribute with organisational knowledge (Iacono et al., 2009). Additionally, all action research methods are cooperative in nature. This methodology evokes a symbiotic circle of set members and researcher that results in a systematic improvement and institutional learning.

Given the conditions of the research, I considered that my role was one of an outsider, in collaboration with insiders. I was an external consultant of the company, hired to optimize the financial position of the

firm, collaborating with firm's representatives to improve working capital metrics and enhance business profitability. Firms may consult outsiders because insiders cannot assign sufficient time and resources to address specific issues, due to their regular workload. University researchers also seek to collaborate with organisations in order to receive experiences as participants in action research, often perceiving cases as an opportunity for publication. For Anderson and Jones (2000) the answers sought from the investigation need to be carefully addressed by businesses and researchers, as the stimulus behind each position is based on the fact that organisations believe they don't know something, which the researcher does, meaning that firms undervalue insiders and believe that they are not able to find a solution by themselves. Outsiders' own perception is based on their knowledge and expertise, believing that they are all-knowing experts. This is incorrect as the goal is to become collaborative investigators, implying that both parties must embrace a position where each has knowledge that is going to be shared to tackle the problem.

Members of Cronos became inside action researchers; set members included a variety of different professionals including accountants, analysts and managers. In research sessions, these collaborators epitomized role duality, a phase where set members are both employees and researchers. This might have confusing connotations, since institutional relations are intertwined in a network of professional affiliations where hierarchical structures prevail. Nevertheless, I set aside these differences and took into consideration the opinion of every single set member, seeing them as equally important.

3.6.2 PRE-UNDERSTANDING OF THE INVESTIGATOR

My position is influenced by pre-understanding (Brannick and Coghlan, 2007): the cognitive skills, knowledge and experience that I had before commencing the research. I held a realist ontological position as I perceived the truth as a single, real and external object (Scotland, 2012). My epistemological stance was positivist as I was an independent observer, who had a goal that needed to be measured using quantitative tools to establish a hypothesis (Yilmaz, 2013).

Furthermore, from a scholarly perspective I am a university instructor in the field of finance, for several lustrums prior to the start of this investigation I had taught quantitative sciences: economics and finance. Also, from a practitioner's view my working experience keenly influenced my pre-understanding; I had been deeply immersed in finance and accounting through my work. Early in my career I worked in financial institutions, and I held the position of trader in the trading room of commercial banks. Later I worked for the real sector in multinational manufacturing firms

as analyst and manager, and more recently I have become a financial consultant for local companies. In February 2013, I began my Doctoral studies in University of Liverpool. After completion of formal courses; in November 2015, I began my Doctoral thesis.

3.7 ONTOLOGY AND EPISTEMOLOGY IN RELATION TO AIM AND OBJECTIVES

Due to the nature of the study, I adopted an ontological position defined as realist. This is because the truth sought regarding whether working capital management explains profitability cannot be observed from an ambiguous or relative standpoint, it can only be perceived through the lens of a realist perspective (Jessop, 2005). Since a specific criterion is needed only a realist stance might be able to ascertain whether the specific metric cash conversion cycle defined in the first objective is able to adequately define a metric for optimal business management. Moreover, a tangible criterion was required to expand the current limits of financial research and meet the second objective, which was to determine new plausible variables to explain profitability. Attaining the third objective relied on the unified effort of both the Cronos team and myself, as researcher. The assembled team was focused on a realistic goal that entailed attaining a single comprehensive objective: enabling the company to improve its financial stance.

It was equally important to envision how to achieve the firm's aim and realistic objectives. Cronos' financial situation and the consequent unique characteristics of the research suggest that to obtain the realistic goal, the epistemological position ought to be positivist. For Becker and Niehaves (2007) the objective knowledge of an autonomous reality allows feasible measures for discrediting subject-bias distortions of veracity reasoning. This idea presupposes an objective perception of an impartial reality grounded on a realist ontological perspective. Therefore, to ascertain objective cognition on the determinants of working capital management, it became imperative to assume an unbiased stance that allowed the research to be impartial. Concordantly, thorough introspection of the plausible regressor based on previous investigations, as depicted in table 1, signalled that understanding the relation of cash conversion cycle and profitability in Ecuador must become objective one. A clear understanding of the first objective, prompted that the objective of cognition determined by the investigator might lie within the realm of multiple sources (Becker and Niehaves, 2007). Therefore, the investigation needed to expand its boundaries to the second objective and seek new variables that explain profitability. For me the work undertaken to fulfil the first two objectives needed to be validated within the framework of a real case. This opportunity arose with the case of Cronos, which became the subject

of study to fulfil the third objective. Cronos presented a contemporary challenging case that required action due to the serious financial situation of the company.

3.8 ACTION RESEARCH ROUNDS

The objective of action research is to produce knowledge by taking action on a particular social problem. Action research is a process that can't be completely premeditated or planned in advance. It is a technique whose processes are disclosed during cycles; these consider outcome and reflection of preceding action research cycles (Herbert et al., 2002). This needs openness and receptiveness regarding the results of a cycle.

The dynamic nature of action research raises new questions, specifically at the reflection phase. This is the key stage because it provides the needed feedback which becomes an input for the next phase (figure 1), thus generating new knowledge. Furthermore, the act of reflecting on results of the questions made produces knowledge which might be used under different contexts for other institutions.

The complex dynamics of action research has been portrayed by Coghlan (2007), as a system of constant input, analysis, reflection and feedback through means of a four-part process of human cognition (experience, understanding, judgement and taking action) as conceived by Holian and Coghlan (2013). This is depicted in figures 2 and 4. This process was followed by the entire action research set, as will be described in chapter six.

In the action research learning environment of Mertler (2016), he implemented a system that established a shared collective effort, maintained by collaborative examinations rendering eloquent growth. His action research community assisted in critically evaluating his professional role as an educator, finding innovative paths to teach. Other authors have described it in a similarly manner, (objective, act and feedback) leading to personal and organisational learning. These phases lead to an understanding of the organisational context and objectives of the problem. This constitutes a preliminary process before collecting information, planning, action and feedback, where every step is closely monitored (Middel et al., 2005).

Additionally, Coghlan (2003) describes two differentiated patterns of action research: mechanistic-oriented action research, which is perceived as the classical action research involved in institutional development, and egalitarian action research steering towards pragmatic problem solving. Organistic-oriented action research involves transformational intuitional issues of company values,

where behaviour in action scrutinizes current protocols and morals observed. The thesis adheres to mechanistic – oriented action research as the inquiry pursued seeks to establish a new protocol through egalitarian and participative discussions, generating usable knowledge for the organisation.

The thesis will proceed to introduce the methodological qualitative segment

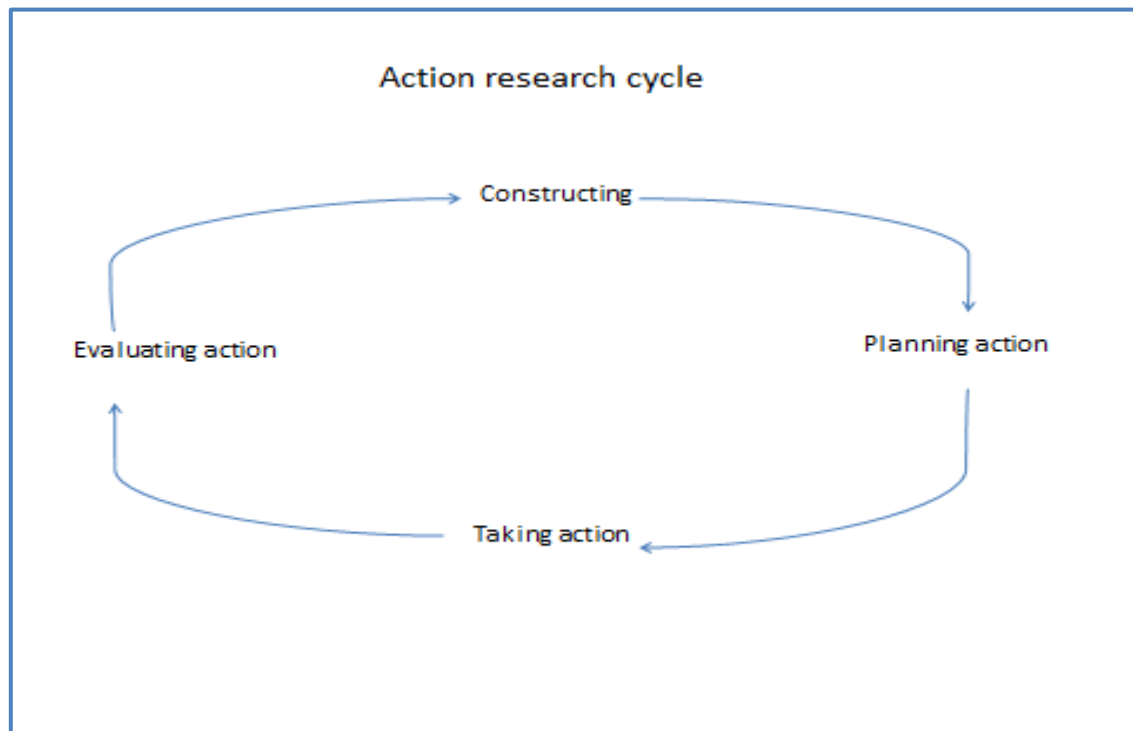


Figure 1. The action research cycle
Source: Adams (2007)

3.9 QUALITATIVE DATA COLLECTION METHODS

Qualitative research synthesizes data from an ample variety of methods of data collection including interviews to people, observational analysis, transcripts of focus groups and open-ended inquiries (Crang, 2002). The general steps of qualitative analysis included information reduction, display of information and conclusions (Morgan, 2007). As previously mentioned, I was able to observe the process of analysis and action in Cronos in my participatory role as an external consultant. Due to the nature of the conundrum, pure observation will not gather the information require for the current investigation. Thus, thesis mixed methodology required the use of interview and a questionnaire for its qualitative assessment (Rapley, 2001).

Questionnaires were designed and applied to the employees identified in section at the start of cycle one. The questions (Appendix 10) sought to determine their profile, in terms of age and professional experience as well as their knowledge and opinions about the variables (financial ratios) affecting the company's profitability. Appendix 10 describes the inquiries based on the eight hypotheses (see section 3.5 and 3.5.1). These questions represent primordial financial metrics depicting operational efficiency in terms of working capital management and profitability. This information was coded and is described in section 3.4. and 3.5

After analysing the data (answers) obtained, and after the initial presentation of the benchmarking analysis, interviews with company Cronos collaborators and executives were conducted with the aim of gaining an enhanced understanding of the complex parts of the problem. Specific focus was put on the negative financial situation of Cronos, which was perceived as being due to the cumulative effect of courses of action which were presumably poorly planned by managers and implemented without questioning by accountants. A second aim was to determine which business determinants were failing, to later amend them and increase profitability.

Depending on the purpose and the stance of the researcher, different methods of interviews might be employed. An unstructured interview is an informal guided dialogue, where the interviewer evokes information from a participant's observed conduct and interactions. Semi-structured interviews take place at a previously selected venue, where the researcher performs open ended inquiries either on an individual or group basis. In highly (in-depth) structured interviews, observations of events and experiences are required to be highly focused and delve profoundly on a social or personal aspect of the investigation. Group interviews require a focus group to share their information about a specific matter. In less structured interviews, an individual interviewed is considered as a participant and perceived as a conduit where data is recovered (DiCicco-Bloom and Crabtree, 2006).

In the case of Cronos, I used semi-structured discussions with firm employees involving accountants, analysts and managers, building on responses to closed questions in the survey to obtain more specific and deeper answers on what had been the *modus operandi* of the company. In addition, questions sought to answer aspects dealing with experience, prioritisation and limitations of working capital management. Furthermore, set member inquiries specifically dealt with financial ratios serving as control variables to further limit and contribute to cash conversion cycle explain profitability. Some of these ratios were previously used and backed up by extant literature, and others are the contribution of the thesis

(Table 18). The qualitative information from the interviews was analysed, transcribed and is described in section 6.7.2.

Focus groups were also conducted with all set members during which they were able to freely express their views. These sessions were conducted without my interference; the colloquium is enclosed in constructive “confrontive inquiry” (Ryan, 2012). The latter is examined framed by “reflection in action” where Cronos set members are at the middle of the action inquiring about the status quo (Marshall, 1999). The set members and I shared an impartial perspective, assuming an unbiased and hermeneutic stance (Coghlan, 2008) of suspicion, maintaining inquiring worldviews, with subjectivity. Through questioning, members can distinguish authentic from false influences, permitting a discussion about a given case without extrinsic interferences (Unluer, 2012).

3.10 CONCLUSION

This chapter described the characteristics and the *modus operandi* in the extant literature. The nature of the firms selected from the SIC was identified, along with an explanation of winsorisation to comply with research protocols. The relative advantages of different financial econometrical methods were compared and panel data was highlighted as the technique that provides more robust information, since it follows financial variables considering more complex observations based on company-time; thus rendering more reliable estimators.

Additionally, the application of panel data is described within a finance perspective, considering working capital elements to be regressed over the existing Ecuadorian data. The investigation analysed both dependent and independent variables employed in working capital research over a seven-year period to infer the effect of WCM and its elements on profitability where there is a proclivity for ROA and ROE to be used as regressands.

The qualitative methodologies employed to examine the process of data analysis for the company under scrutiny included questionnaires and interviews with Cronos employees to raise valuable information about the firm’s *modus operandi* and results so far. I inquired about quantitative metrics of company performance using qualitative methods. Moreover, the use of mode two on the action research discussion, employing professionals from different disciplines, has enabled me to bring forth new perspectives combining both quantitative and qualitative methods that could assist Cronos in its financial conundrum.

In the following chapter the results of the quantitative analysis are presented. Various tests were carried out and the results for each are presented in tabular form and described in the text. There is a complete econometrical assessment of the data.

CHAPTER FOUR

EMPIRICAL RESULTS

4.1 INTRODUCTION

This chapter presents the key findings of the quantitative analysis, conducted using the methodology set out in chapter three and building on the methods, conclusions and recommendations of the works scrutinised in the literature review. The results examine the complex relation between 46 selected companies through the quantitative methodology described in chapter three. This chapter shows the empirical results of the investigation into the relation between working capital management and profitability in order to determine working capital determinants which explain profitability. The chapter explains the results of the dependent variable used; and it also describes the outcome of the chosen regressands in the current research. It follows a variable of interest while controlling for specific variables which were previously used in earlier studies. The investigation reveals two outcomes epitomised in the form of two statistically significant equations. These are set out in section 4.2.1. The investigation shows the actual results in the descriptive statistics section; and it also shows the relation among regressors in a correlation analysis. It displays the outcome of pooled OLS and regressions using panel data with random and fixed effects. Additionally, this section describes and exhibits the econometrical assessment of the data employed.

4.2 RESEARCH RESULTS

4.2.1 QUANTITATIVE OUTCOME

The research found two statistically significant models which are depicted in Equations 4 and 5 in this section; these are the generic econometrical forms. The actual results for random effects are presented in equations 8 and 9 in section 4.3.2, and fixed effects in equations 10 and 11, in section 4.3.3. As per recommendation of the Hausman test, the investigation used fixed effects. The next step involved the selection from the two models (group 1 and 2). The Akaike and Schwarz criterion (Acquah, 2010) recommends choosing a model with less information loss (appendix 9.4). In this case, equation 11 should be chosen since its AIC and BIC metric suggests a smaller value. Additionally, equation 11 has the most relevant coefficient for adjusted R-squared⁹. This metric explains the percentage variation of the dependent variable given the independent variables. However, since the adjusted R-square did not vary

⁹ Command areg in Stata facilitates the calculation of R² on panel data with fixed effects

significantly, parsimony (McAleer and Da Veiga, 2008) was also considered when selecting from the two potential statistically significant equations. The term parsimony means that the simplest model with least variables should be used. Although the model on equation 10 is more parsimonious, equation 11 has more econometrical support. Furthermore, equation 10 shows exogeneity whilst equation 11 presents endogeneity (Appendix 9.5). Therefore, both models were selected to explain properly how the siderurgical corporate sector behaves; group 1 refers to equation 10 and group 2 refers to equation 11.

$$Profitability_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 Size_{it} + \beta_3 PP_{it} + \beta_4 Debt_{it} + \beta_5 CATA_{it} + u_{it} \quad (4)$$

$$Profitability_{it} = \beta_0 + \beta_1 ARP_{it} + \beta_2 FAturn_{it} + \beta_3 Timinter_{it} + u_{it} \quad (5)$$

Where:

i = companies

t = time (in years)

β_n = regression coefficients

Profitability = earnings before interest and taxes divided by total assets

CCC = cash conversion cycle (days)

Size = logarithm of assets

PP = accounts payable period

Debt = total debt divided by assets

CATA = current assets divided by total assets

ARP = accounts receivables period

FAturn = sales divided by fixed assets

Timinter = earnings before interest and taxes divided by interest expense

u = residual term

4.2.2 DESCRIPTION OF DEPENDENT VARIABLE

Extant literature suggests that profitability is mainly measured by ROS, ROA, and ROE. These are used as metrics for company performance given the resources employed. Furthermore, these ratios eradicate the effect of size, permitting across industry analysis. The variable profitability is depicted as earnings before interest and taxes (EBIT) divided by assets, as a measure of general business performance. This

valuation metric is inspired by Novy-Marx's (2013) cross-sectional regressions of gross profit decomposition, using earnings before interest taxes depreciation and amortisation (EBITDA) and general, sales administrative expenditures (XSGA). These statistically significant metrics are capable of explaining returns. Additionally, García-Teruel and Martínez-Solano (2007) describe their endogenous variable as return on assets (ROA) although they are not using net income as earnings. Instead, they use the ratio of earnings before interest and taxes divided by assets. Furthermore, following García-Teruel and Martínez-Solano (2007) the research uses profitability over return on equity (ROE) to avoid capital structure discrimination. ROE as a profitability measure only considers owner's equity as the input against which company returns should be measured. ROA is considered a holistic and more robust measure since it acknowledges all sources of asset financing: liabilities and equity, which aided and financed company resources.

Following Deloof (2003), Lazardis and Tryfonidis (2006) and Shin and Soenen (1998), the research data did not consider companies providing financial services. Additionally, ROE and return on sales (ROS) did not respond properly as regressands¹⁰ against the variable of interest and controls on the panel data regression.

4.2.3 DESCRIPTIVE STATISTICS

To provide a fair assessment, in Table 7 the research compared 322 iron and steel corporations with similar characteristics to those of Cronos. The Table provides the descriptive statistics; it can be observed that firms on average have a return on assets of 10%. Coincidentally, this is the same return as in the sample of all observations. Companies yield is leveraged as it takes 59% of liabilities to finance assets. This high percentage indicates that more debt than equity is used. This is consistent with hypothesis two; implying that companies are leveraged. Business resources are concentrated in the short term; this is confirmed by 71% in current assets over total assets ratio. The payables are 77 days; whereas to complete the cycle of restocking, selling to customers and paying to suppliers takes 72 days.

¹⁰ Variables did not pass econometric tests

Table 6. Descriptive statistics for all variables.

Variable	Standard							
	Observations	Mean	Deviation	Median	Min	Max	Skewness	Kurtosis
Profitability	322	0.10	0.07	0.07	-0.001	0.60	1.79	7.84
CCC	322	72.34	132.14	55.86	-4,245.85	1,283.19	-12.23	501.10
Size	322	15.68	0.52	18.63	17.86	29.32	1.01	5.89
PP	322	77.19	101.35	59.73	0.0005	4,515.21	45.32	715.95
Debt	322	0.59	0.38	0.62	0.00009	0.99	-0.50	2.84
CATA	322	0.71	0.20	0.67	-0.004	0.89	-0.42	2.38
Faturn	322	71.78	401.14	10.09	0.12	9,139.85	14.54	301.14
ARP	322	6.09	31.14	1.39	1.03	1,298.60	25.24	1,099.45
TimInter	322	707.19	11,236.51	3.95	0.69	1,215,153	49.28	1,562.98

This table provides the descriptive statistics for all variables in the estimation of the relation between working capital management and profitability. The matrix is based on a sample of 322 companies regulated by Superintendence of Companies in the period 2000-2006. The endogenous variable is profitability, the variable of interest is cash conversion cycle (CCC), the control variables are logarithm of assets (Size), payment period (PP), total debt divided by total assets (Debt), current assets divided by total assets (CATA), sales divided by fixed assets (Faturn), 365 divided by (sales divided by accounts receivable) (ARP) and EBIT divided by interest expense (Timinter).

4.2.4 PEARSON CORRELATION MATRIX

The parametric bivariate measurement of Pearson correlation is the assessment of dependence of variables to determine their degree of association. It contemplates the combined variation in two variables (Gaud et al., 2005) and aids the analysis of how strong (or weak) the linear relation between two metrics is. Test outcome fluctuates between positive one to minus one. Figures close to those values depict a stronger or weaker affinity between the variables respectively. Nevertheless, the correlation matrix is employed to determine the presence of collinearity in the data set.

The low coefficients on the Pearson correlation matrix on Table 8 and Table 9 depict a weak relation between the variables. Furthermore, this indicates that since ρ is significantly less than one, the possibilities of multicollinearity are low. To confirm this, a variance inflation factor (VIF) needs to be performed.

Table 8. Pearson correlation matrix. Group 1.

Variable	Profitability	CCC	Size	PP	Debt	CATA
Profitability	1					
CCC	-0.10	1				
Size	-0.06	0.31	1			
PP	-0.09	-0.42	0.12	1		
Debt	-0.29	-0.17	-0.11	0.07	1	
CATA	0.06	0.04	-0.18	0.09	0.38	1

This table reports the Pearson correlation coefficients for all variables in the estimation of the relation between working capital management and profitability. The endogenous variable is profitability, the variable of interest is cash conversion cycle (CCC), the control variables are logarithm of assets (Size), payment period (PP), total debt divided by total assets (Debt), current assets divided by total assets (CATA).

Table 9. Pearson correlation matrix. Group 2.

Variable	Profitability	CCC	ARP	Faturn	TimInter
Profitability	1				
CCC	-0.09	1			
ARP	-0.23	-0.31	1		
Faturn	-0.15	-0.47	-0.05	1	
TimInter	-0.25	-0.19	-0.08	0.07	1

This table reports the Pearson correlation coefficients for all variables in the estimation of the relation between working capital management and profitability. The endogenous variable is profitability, the variable of interest is cash conversion cycle (CCC), the control variables are 365 divided by (sales divided by accounts receivable) (ARP), sales divided by fixed assets (Faturn), and EBIT divided by interest expense (Timinter).

4.2.5 SPEARMAN CORRELATION MATRIX

Table 10. Spearman correlation coefficients. Group 1.

		Profitability	CCC	Size	PP	Debt	CATA
Profitability	Correlation coefficient	1					
	P-value	0					
CCC	Correlation coefficient	0.04	1				
	P-value	0.22	0				
Size	Correlation coefficient	-0.07	0.42	1			
	P-value	0	0	0			
PP	Correlation coefficient	-0.27	-0.12	0.38	1		
	P-value	0	0	0	0		
Debt	Correlation coefficient	-0.32	-0.39	-0.15	0.21	1	
	P-value	0	0	0	0	0	
CATA	Correlation coefficient	0.09	0.10	-0.21	0.11	0.35	1
	P-value	0	0	0	0	0	0

This table reports the Spearman correlation coefficients for all variables in the estimation of the relation between working capital management and profitability. The endogenous variable is profitability, the variable of interest is cash conversion cycle (CCC), the control variables are logarithm of assets (Size), payment period (PP), total debt divided by total assets (Debt), current assets divided by total assets (CATA).

Table 11. Spearman correlation coefficients. Group 2.

		Profitability	CCC	ARP	Faturn	Timinter
Profitability	Correlation coefficient	1				
	P-value	0				
CCC	Correlation coefficient	0.04	1			
	P-value	0.12	0			
ARP	Correlation coefficient	0.07	0.03	1		
	P-value	0.02	0.005	0		
Faturn	Correlation coefficient	-0.19	-0.07	-0.04	1	
	P-value	0	0	0.18	0	
Timinter	Correlation coefficient	-0.21	-0.22	-0.08	0.11	1
	P-value	0	0	0	0	0

This table reports the Spearman correlation coefficients for all variables in the estimation of the relation between working capital management and profitability. The endogenous variable is profitability, the variable of interest is cash conversion cycle (CCC), 365 divided by (sales divided by accounts receivable) (ARP), the control variables are sales divided by fixed assets (Faturn), and EBIT divided by interest expense (Timinter).

4.2.6 SPEARMAN CORRELATION

This correlation test is based on H_0 : no monotonic correlation¹¹ in population. H_1 : monotonic correlation exists. This has a t-distribution with $n-2$ degrees of freedom. If there are non-repeated values, then a perfect Spearman correlation takes place (same range as Pearson - 1 to + 1) when every single variable is a perfect monotonic function of the other.

$$H_0 : \rho_s = 0. \quad (2)$$

$$H_1 : \rho_s \neq 0. \quad (3)$$

Rho coefficients are zero on Table 10; this implies that we accept the null hypothesis (equation 2) of no monotonic correlation in population. Interestingly the overwhelming majority (with one exception) in Table 11 reveals $\rho = 0$ again accepting the null. However, there is a different than zero correlation ($\rho = 0.0823$) therefore H_0 can be rejected in favour of H_1 (equation 3). A monotonic correlation exists between CCC and profitability (Table 10 and Table 11). Also, Table 11 shows the same condition between PP and size, CCC and size, FAturn and size, and Timinter and size. The Spearman correlation test ranks the observations from small to large of X_i and Y_i . Then it calculates the difference between those two metrics (Bagchi et al., 2012).

4.3 WORKING CAPITAL REGRESSION MODEL

4.3.1 POOLED OLS

The pooled ordinary least squares (OLS) deliver consistent and efficient estimators of same intercept and slope. Unfortunately, this technique assumes unit-specific effects implying that companies are not different. In reality, it is highly unlikely that companies are the same. Furthermore, pooled OLS is a heteroscedasticity prone model across units (companies) and may have serial correlation within the panel (Hirshleifer and Shumway, 2003). The information in Table 12 shows a negative relation between return on assets and cash conversion cycle. Moreover, size on Table 12 is seen to have a positive relation with the regressand and current assets in terms of total assets has a positive relation with return on assets (Table 12).

In Table 12 it can be seen that accounts payables period has a negative relation with profitability implying that the smaller this metric is, the higher the company profitability. Alternatively, earnings

¹¹ Monotonic is whether the variable is linear or not

before interest and taxes (EBIT) capacity to cover interest is positively related to profitability. This suggests that the bigger these metrics are, the higher the profitability for firms.

Table 12. Pooled OLS. Group 1.

Profitability	(1)	(2)	(3)	(4)	(5)
CCC	-0.00002 (0.000)***	-0.00002 (0.000)***	-0.0001 (0.000)***	-0.0001 (0.000)***	-0.0001 (0.000)***
Size		0.007 (0.003)***	0.007 (0.003)***	0.006 (0.003)***	0.006 (0.003)***
PP			-0.0001 (0.000)***	-0.0001 (0.000)***	-0.0001 (0.000)***
Debt				-0.078 (0.007)***	-0.088 (0.007)***
CATA					0.079 (0.007)***
Constant	0.120 (0.004)***	-0.014 (0.055)	0.002 (0.059)	0.069 (0.041)	0.011 (0.040)
Observations	322	322	322	322	322
Degrees of freedom	320	319	318	317	316
R-squared	0.01	0.02	0.05	0.12	0.18
Robust and standard errors in brackets					
*Significant at 10% **Significant at 5% ***Significant at 1%					

This table describes the pooled ordinary least squares. The endogenous variable earnings before interest and taxes divided by assets (Profitability) were regressed using OLS. Against the variable of interest cash conversion cycle (CCC), controlling for logarithm of assets (Size), payment period (PP), total debt divided by total assets (Debt), current assets divided by total assets (CATA).

Table 13. Pooled OLS. Group 2.

Profitability	(1)	(2)	(3)	(4)
CCC	0.039 (0.011)**	0.031 (0.014)**	0.031 (0.011)**	0.041 (0.019)**
ARP	-0.008 (0.003)	-0.009 (0.003)	-0.005 (0.002)	-0.005 (0.002)
FAturn			-5.09e-04 (0.000)***	-2.68e-03 (0.000)***
Timinter				+0.0001 (0.000)***
Constant	0.015 (0.051)**	0.014 (0.052)**	0.012 (0.051)**	0.014 (0.052)**
Observations	322	322	322	322
Degrees of freedom	320	319	318	317
R-squared	0.09	0.11	0.12	0.15
Robust and standard errors in brackets				
*Significant at 10% **Significant at 5% ***Significant at 1%				

This table describes the ordinary least squares regression. The variable earnings before interest and taxes divided by assets (Profitability) is the regressand. This was regressed against the variable of interest cash conversion cycle (CCC), 365 divided by (sales divided by accounts receivable) (ARP), the control variables are sales divided by fixed assets (FAturn), and EBIT divided by interest expense (Timinter).

4.3.2 RANDOM EFFECTS

The model depicted in equation 6 and epitomized in Table 14 and Table 15 does not assume a unique constant term, or that intercepts for individual units (businesses) vary from the constant term in a random manner. (Equation 6) The model is helpful to control unseen heterogeneity when the latter is fixed over time and correlated with exogenous variables. In panel data, multilevel models facilitate more than a single level of clustering considering unit data through time. (Rabe-Hesketh et al., 2005).

$$y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_i + u_i + \varepsilon_{it} \quad (6)$$

Random effects models are beneficial for panel data where the outcome of the unit (i.e. firms) cannot be presumed to be independent after conditioning on independent variables, allowing for individual effects

(Equation 7). This model explores the differences in error variance components. Individual effects are not correlated with regressors. Random effects assume that the variations across units are random, therefore uncorrelated with exogenous variables. In addition, in RE the intuition behind the research is that differences across businesses may influence the regressand (i.e. profitability). Time-invariant variables are indeed considered in this model, whereas in fixed effects these variables are absorbed by the intercept. Random effects assume that a company's error term is uncorrelated with independent variables. Ergo, time-invariant variables like financial managerial philosophy certainly become explanatory variables seeking to explain ROA (Clark and Linzer, 2015).

$$\mathbb{E} = [u_i | X_i, Z_i] = 0 \quad (7)$$

Table 14. Robustness results panel data random effects. Group 1.

Profitability	(1)	(2)	(3)	(4)	(5)
CCC	-0.00003 (0.000)*	-0.00003 (0.000)**	-0.00002 (0.000)***	-0.00001 (0.000)***	-0.00001 (0.000)***
Size		0.009 (0.004)***	0.007 (0.004)***	0.006 (0.003)***	0.012 (0.003)***
PP			-0.00002 (0.000)***	-0.00002 (0.000)***	-0.00001 (0.000)***
Debt				-0.045 (0.006)***	-0.063 (0.006)***
CATA					0.075 (0.009)***
Constant	0.111 (0.002)***	-0.071 (0.048)	-0.020 (0.046)	-0.025 (0.042)	-0.081 (0.047)*
Observations	322	322	322	322	322
Degrees of freedom	320	319	318	317	316
Robust and standard errors in brackets					
*Significant at 10% **Significant at 5% ***Significant at 1%					

The table depicts the outcome of working capital management and profitability relation using panel data (random effects).

$\text{PROFITABILITY}_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + u_i + \varepsilon_{it}$. Where: $\text{PROFITABILITY}_{it}$ is the explained variable earnings before interest and taxes divided by assets, this was regressed using OLS. Against X the variable of interest cash conversion cycle (CCC), Z are the control variables logarithm of assets (Size), payment period (PP), total debt divided by total assets (Debt). Current assets divided by total assets (CATA), u_i is the unobserved business effect ε_{it} the idiosyncratic shock. β_1 and β_2 are the slopes of estimated parameters.

$$\text{Profitability}_{it} = -0.081 - 0.0001\text{CCC} + 0.012\text{Size} - 0.0001\text{PP} - 0.063\text{Debt} + 0.075\text{CATA} + u \quad (8)$$

0.047 0.000 0.003 0.000 0.006 0.009

$$\text{Profitability}_{it} = -0.081 - 0.00008\text{CCC} - 0.0007\text{ARP} + 0.00005\text{Faturn} + 0.00009\text{Timinter} + u \quad (9)$$

0.061 0.000 0.000 0.000 0.000

Table 15. Robustness results panel data random effects. Group 2.

Profitability	(1)	(2)	(3)	(4)
CCC	-0.00009 (0.000)	-0.00009 (0.000)	-0.00008 (0.000)	-0.00008 (0.000)
FAturn		0.00009 (0.000)	0.00005 (0.000)	0.00005 (0.000)
ARP			--0.0007 (0.000)	-0.0007 (0.000)**
Timinter				0.00009 (0.000)
Constant	-0.087 (0.095)	-0.085 (0.091)	-0.085 (0.088)*	-0.081 (0.061)
Observations	322	322	322	322
DF	320	319	318	317
Robust and standard errors in brackets				
*Significant at 10% **Significant at 5% ***Significant at 1%				

The table depicts the results of working capital management and profitability relation using panel data (random effects). $PROFITABILITY_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + u_i + \varepsilon_{it}$. Where: $PROFITABILITY_{it}$ is the variable earnings before interest and taxes divided by assets is the regressand. This was regressed against X the variable of interest cash conversion cycle (CCC). Z are the control variables are 365 divided by (sales divided by accounts receivable) (ARP), the control variables are sales divided by fixed assets (FAturn), and EBIT divided by interest expense (Timinter).

4.3.3 FIXED EFFECTS

The corner stone of this methodology is the linear function of the individual effect with other variables. Panel data models utilizing fixed effects (FE) relax the orthogonality assumption of equation 7, but the estimator is inconsistent when the observation length is fixed (Greene, 2004). This model assumes that slope coefficients are fixed for all business. For Greene (2014), differences across units (firms) may be represented in changes in the fixed term. With fixed effects, the unobservable is considered as an unknown parameter. Unlike random effects, effects do not need to be considered as independent of the disturbance, since the unobserved individual effect is correlated with the variables.

However, the fixed effects estimator cannot provide an estimation of the influence of time-invariant variables. Consequently, time-invariant variables are eliminated by disparities from averages. In Table

16 and Table 17 the model employed panel data with fixed effects. This method is a combination of time series and cross sectional data; it is used when the investigation would like to analyse the impact of variables that fluctuate over time. This model assumes different constant terms for individual businesses since cross-sectional regressions might be susceptible to heteroscedasticity. Every company has its own individual characteristics which may (or may not) influence the independent variables.

Moreover, FE is used when the research assumes that something on the unit (company) may have an influence or bias the exogenous variables and this needs to be controlled. For instance, company size may have an influence as firms with more financial resources, invest significantly in assets (Bartels, 2008). Concordantly, FE eliminates the effects of those time-invariant characteristics (that do not change over time) to examine the pure effect of the exogenous variable on the regression result.

Additionally, this model assumes that time-invariant characteristics of a company are unique, and should not be correlated with traits of another firm. For instance, financial managerial philosophy varies among companies, but it is constant over time for a given business. From a financial-econometrical stance each company is unique, the error term and the constant (that captures individual characteristics) should not be correlated.

Table 7. Robustness results panel data fixed effects. Group 1.

Profitability	(1)	(2)	(3)	(4)	(5)
CCC	-5.15e-05 (0.000)	-0.00009 (0.000)	-0.0001 (0.000)***	-0.0001 (0.000)***	-0.0001 (0.000)***
Size		0.029 (0.007)***	0.027 (0.007)***	0.020 (0.006)***	0.020 (0.006)***
PP			-0.0003 (0.000)***	-0.0003 (0.000)***	-0.0001 (0.000)***
Debt				-0.062 (0.009)***	-0.049 (0.006)***
CATA					0.079 (0.021)***
Constant	0.399 (0.005)***	-0.320 (0.008)**	-0.280 (0.056)	-0.252 (0.085)***	-0.218 (0.094)**
Observations	322	322	322	322	322
Degrees of freedom	320	319	318	317	316
Robust and standard errors in brackets					
*Significant at 10% **Significant at 5% ***Significant at 1%					

The table depicts the outcome of working capital management and profitability relation using panel data (fixed effects). $PROFITABILITY_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + u_i + \varepsilon_{it}$. Where: $PROFITABILITY_{it}$ is the explained variable earnings before interest and taxes divided by assets this was regressed using OLS. Against X the variable of interest cash conversion cycle (CCC), Z are the control variables logarithm of assets (Size), payment period (PP), total debt divided by total assets (Debt), current assets divided by total assets (CATA), u_i is the unobserved business effect ε_{it} the idiosyncratic shock. β_1 and β_2 are the slopes of estimated parameters.

Table 87. Robustness results panel data fixed effects Group 2.

Profitability	(1)	(2)	(3)	(4)
CCC	-4.32e-04 (0.003)	-0.0006 (0.001)	-0.0005 (0.00)	-0.0005 (0.00)
FAturn		0.00004 (0.000)**	0.00004 (0.000)**	0.00002 (0.000)**
ARP			-0.0007 (0.0001*)	-0.0007 (0.000)*
Timinter				0.00008 (0.000)**
Constant	-0.399 (0.088)***	-0.295 (0.085)***	-0.277 (0.092)***	-0.272 (0.096)***
Observations	322	322	322	322
DF	320	319	318	317
Robust and standard errors in brackets				
*Significant at 10% **Significant at 5% ***Significant at 1%				

The table depicts the results of working capital management and profitability relation using panel data (fixed effects). $PROFITABILITY_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + u_i + \varepsilon_{it}$. Where: $PROFITABILITY_{it}$ is the variable earnings before interest and taxes divided by assets the regressand. This was regressed against X the variable of interest cash conversion cycle (CCC). Z are the control variables are, 365 divided by (sales divided by accounts receivable) (ARP), the control variables are sales divided by fixed assets (FAturn), and EBIT divided by interest expense (Timinter).

$$Profitability_{it} = -0.218 - 0.0001 CCC + 0.02Size - 0.0001PP - 0.049 Debt + 0.079CATA + u \quad (10)$$

0.094 0.000 0.006 0.000 0.006 0.021

$$Profitability_{it} = -0.272 - 0.0005CCC - 0.0007ARP + 0.00002FAturn + 0.00008 Timinter + u \quad (11)$$

0.096 0.00 0.000 0.000 0.000

4.4 ECONOMETRICAL ASSESSMENT.

The subsequent terms are used (in panel data) in the following section of the investigation

u = the residual

i = the unit

t = time periods

a = the unobserved effect

N = normal distribution

4.4.1 HOMOSCEDASTICITY TEST

Residuals are homoscedastic if they comply with equation 12.

$$Var(u_{it} | X_i, a_i) = \sigma^2(u_{it}) \forall t \quad (12)$$

This implies that for each period, the variance of the residual, given the exogenous variables in all time periods, and considering the unobserved effect, is constant.

The investigation tested homoscedasticity using the Breusch - Pagan test, where the null hypothesis is H_0 : homoscedasticity and the alternative hypothesis is H_1 : heteroscedasticity. This test reveals a P value of zero. The investigation rejected H_0 in favour of H_1 since there is heteroscedasticity; the variance of the residuals increases as a function of at least one of the independent variables. To eliminate this abnormality, the investigation implemented cluster standard errors at company level. Thus, these figures are autocorrelation and homoscedastic robust (Ferson et al., 2003). The Breusch - Pagan test does not function properly for nonlinear forms of heteroscedasticity where residual variances become larger, when the regressor increases. This test has complications when the residual does not follow a normal distribution. Therefore, the investigation performed the White test; the P-value of zero indicates that equations 10 and 11 are heteroscedastic.

4.4.2 COLLINEARITY EVALUATION

When regressors are highly correlated, the accuracy of parameter estimation is compromised, because the $\sigma \widehat{\beta}_2$ and $\sigma \widehat{\beta}_3$ in equation 13 may be large (Elhorst, 2003), implying that regressors are not independent, but rather that there is a relation between them as observed in equation 14:

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_n X_n + u \quad (13)$$

The variance inflation factor (VIF) for the slope of coefficient n is $1/(1-R_j^2)$. If the coefficient is bigger than ten, the regression is biased. Investigation coefficients of 1.28 and 2.07 in equation 10 and 11

respectively are lower than the generic cut off value of ten. According to Craney and Surles (2002), this confirms the absence of collinearity among independent variables and no remedial action is needed.

$$\forall X_{it} \rho \neq 1 \quad (14)$$

4.4.3 NORMALITY VALUATION

Equation 15 mentions that conditional on the independent variables and the unobserved, the residuals are independent and identically distributed (i.i.d.) following a normal distribution.

$$u_{it} \sim N(0, \sigma^2) \quad (15)$$

For Thadewald and Büning (2007), the Jarque–Bera assessment of normality measures the skewness and kurtosis. If data is normally distributed, the values are zero and three respectively. This test performs best for data symmetrically distributed with medium and long tails and it may also work to some extent for skewed distributions. However, test effectiveness decreases significantly with short tails, on occasions the test is biased. For these different cases, the Shapiro–Wilk evaluation is highly advised. The Jarque–Bera test reveals a p-value of zero for both equations 10 and 11. This means that model residuals are not normally distributed. Furthermore, the Shapiro–Wilk test of normality of residuals has also p-value of zero, and this entails the same conclusion. Variables are not normally distributed.

4.4.4 HAUSMAN TEST

The Hausman test in equation 16 corroborates whether fixed or random effects should be employed. The latter suggests whether the unobserved individual effects exemplify elements that are correlated with exogenous variables but not whether these effects are random or not (Clark and Linzer, 2015). In contrast, fixed effects are used when there is an interest in the influence of variables that change over time. Fixed effects depict the relationship between independent variables and outcome variables within a unit (i.e., company). Each unit has its own characteristics that may have an impact on exogenous variables; this needs to be controlled. If there is no correlation between unseen heterogeneity and the independent variables, then random effects might be used. This test uses generalized least squares. This technique is appropriate when the observations are randomly obtained from the population. In addition, this method is adequate for observations that are time invariant. (Bai, 2009).

Furthermore, random effects are appropriate when the orthogonality premise of unseen firm effects not correlated with the regressors is not broken. However, even if the orthogonality premise is violated the fixed effects estimator remains unbiased and consistent.

$$Hausman = (\beta_{FE} - \beta_{RE})' (\sigma \beta_{FE} - \sigma \beta_{RE})^{-1} (\beta_{FE} - \beta_{RE}) \sim X_k^2 \quad (16)$$

$$H_0 = cov(n_i; x_{it}) = 0 \quad (17)$$

$$H_1 = cov(n_i; x_{it}) \neq 0 \quad (18)$$

In the null hypothesis (equation 17) fixed effects are consistent but not efficient. However, under the alternative hypothesis (equation 18) they are consistent and efficient. Hausman test H_0 : random effects are appropriate; H_1 : fixed effects are appropriate. If the p-value is < 0.05 then we reject H_0 , in favour of H_1 . Since the test outcome, p-value is 0; the investigation rejected H_0 , in favour of H_1 . Fixed effects should be used.

4.4.5 ENDOGENEITY EXAMINATION

Endogeneity may have different sources such as measurement mistakes, omitted variables and simultaneity. The ordinary least squares seek to ascertain through causality a social phenomenon where the exogenous variables explain the regressand. Equation 19 depicts the endogeneity singularity of causality bias (reverse causality) where the previously mentioned features occur. However, the regressand simultaneously explains the independent variable (Coles et al., 2012). For Nikolaev and Van Lent (2005) one of the reasons for simultaneity bias (endogeneity) is the violation of the Gauss - Markov assumption of exogeneity: $Cov(X_n, u) = 0$, zero conditional mean, $E(u_{it} | X_i, a_i) = 0$. For Semykina and Wooldridge (2010), omission of time varying aspects, simultaneous reactions to idiosyncratic shocks and assessment of error may lead to this bias; due to $\rho \neq 0$ among independent variables and idiosyncratic errors. Ozkan (2001) adds that in finance, endogeneity may take place due to the fact that observable and unobservable shocks disturbing capital structure are also possibly disturbing other firm specific characteristics like equity market value.

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_n X_n + u. \quad X \rightarrow Y \text{ but also, } Y \rightarrow X \quad (19)$$

The Durbin-Wu-Hausman test ascertains the presence of endogeneity. H_0 : variables are exogenous. H_1 : variables are endogenous. P-value<0.05, H_0 can be rejected in favour of H_1 . The research outcome p-values of 0.2418 and 0.1450 in equation 10 and 11 respectively indicate the existence of exogeneity.

4.4.6 AUTOCORRELATION (SERIAL CORRELATION) TEST.

Equation 20 considers panel data models of the form:

$$y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_i + u_i + \varepsilon_{it} \quad (20)$$

Autocorrelation in panel data provokes biased residuals and causes less efficient outcomes (Drukker, 2003). Where X_{it} is a time-varying covariate, Z_i is time-invariant covariate, u_i is the individual level effect and ε_{it} is an idiosyncratic error. If there is a correlation between u_i and X_{it} or Z_i , the coefficients of X_{it} might be consistently estimated using first differenced data. When u_i are not correlated with time-varying covariate and time-invariant covariate, the coefficients of X_{it} and Z_i are estimated in a consistent and efficient manner using random effects. These estimators assume that:

$$\forall t \neq s, Cov(u_{it}, u_{is} | X_i, a_i) = 0 \quad (21)$$

Equation 21 describes that for all periods the residuals are uncorrelated, conditional on all explanatory regressors and the unobserved effect. The Durbin–Watson test and Wooldridge test may detect first-order serial correlation on fixed effects. However, these examinations for Born and Breitung (2016) have limitations, since data has to be normally distributed and the tests are not heteroscedasticity robust. The research tested the data using the Wooldridge test for autocorrelation on panel data. H_0 : no first-order autocorrelation, H_1 : autocorrelation. This test reveals a P value of zero so the investigation rejected H_0 in favour of H_1 ; there is autocorrelation. The Breusch-Godfrey test for higher-order serial correlation could not be run due to the fact that the sample may not include multiple panels.

4.4.7 MODEL SPECIFICATION

$$E(u_{it} | X_i, a_i) = 0 \quad (22)$$

For each period, the expected value of the residual given the exogenous variables in all time periods considering the unobserved effect is zero (Semykina and Wooldridge, 2010). In a multiple regression some of the independent variables are relevant whilst others might be considered redundant variables. The investigation performed the Ramsey test of regression specification error test (RESET), considering H_0 : the model is correctly specified, and H_1 : model is not correctly specified. The p-value of zero on equations 10 and 11 reveal that there appears to be misspecification of the model; this might cause the violation of the independence among the residual and exogenous variables. Other examples of violations and plausible reasons for lack of compliance on equation 22 revolve around an omitted variable or simultaneity bias (endogeneity).

4.4.8 ROBUSTNESS EVALUATION

Estimations are often inaccurate due to the presence of outliers; these are observations whose behaviour is anomalous in comparison with regular data. A robust estimator is not distorted much by adding or removing data (Bramati and Croux, 2007).

To evaluate the robustness of cash conversion cycle (the variable of interest), control variables were gradually added. For both fixed effects equations, 10 and 11, the direction of the coefficients remained steady. Regarding the magnitude, although the coefficient of CCC initially changed in equation 11 as subsequent controls were provided; additional combinations on Table 17 reported a stable non fluctuating value of -0.0005, implying this estimator is consistent. The variable of interest and controls in equation 10 were replicated and expanded with additional controls in equation 11. Since both equations revealed relevant outcomes from different perspectives, the investigation kept both. For random effects equations, the direction of the coefficients persisted negatively -0.0001 showing no change. Additionally, equation 9 direction is negative and the magnitude has again remained constant; the coefficient is -0.0008.

4.5 CONCLUSION

This chapter presents the empirical results of the quantitative analysis conducted in order to ascertain the relation between working capital management and profitability. The objective was to establish the working capital determinants that explain profitability. The investigation used profitability as the dependent variable considering CCC as the variable of interest depicting financial operational efficiency. The research implemented control variables as a stimulus on CCC and its elements on profitability. The

regression demonstrates that the variable of interest has a negative coefficient; this is consistent with the extant literature. When cash conversion cycle and its components diminish, profitability is enhanced. In the following chapter the results of the quantitative results are discussed in detail. The analysis carried out to fulfil the first two objectives of this investigation are explored, namely the effect of working capital and its elements on profitability, and the role of the chosen variables. The results of the traditional pooled ordinary least square regression (POLS) as well as random and fixed panel data regressions are also explored. The contribution that this work makes to the field of financial literature is discussed.

CHAPTER FIVE

DISCUSSION OF EMPIRICAL RESULTS

5.1 INTRODUCTION

The following chapter discusses the results obtained from the quantitative analysis, contrasting and comparing the theoretical framework of both exogenous and endogenous variables. The influence of working capital and its elements on profitability is explored in order to ascertain the effect caused by the numerous factors suggested by the theoretical and practical framework. To this end, the chosen variables applied to the Ecuadorian system are scrutinised, analysing the traditional pooled ordinary least square regression (POLS) as well as random and fixed panel data regressions. The variable of interest along with control variables are deliberated, considering the applicability of these metrics within the functionality of the Superintendence of Companies (SIC) data. The investigation discusses the impact of cash conversion cycle (CCC) and the effect that control variables have on the dependent variable. Furthermore, the chapter discusses the contribution of this thesis to the body of financial literature, incorporating additional variables never used before, yet statistically significant within the framework of this investigation, seen to influence the relation between working capital management and profitability.

5.2 DESCRIPTIVE STATISTICS

Table 7 describes the statistics for all variables after winsorisation. The dependent variable is profitability (section 4.2.1) which ranges from a minimum of -0.003 to a maximum of 0.56. Companies from the sample report a return of 11% on average. The variable of interest is cash conversion cycle; on average it takes 70.97 days to sell merchandise, provide credit and pay suppliers. Its range varies from a minimum -4,414.71 up to 1,337.99, which is explained by a high standard deviation of 124.15. The minimum accounts payable varies from 0.0003 to a maximum of 4,837.33; this wide range can be explained by a high volatility of 120.50 days. Firms on average honour their commitments to suppliers in 75.17 days. Reported Ecuadorian firms are on average indebted by 57%; interestingly the data suggests that some firms may be completely financed using leverage, which is extremely risky. CATA of 0.69 shows that the average company invests more resources in the short term than in the long term. Although, more firms invest in current assets, some firms have invested in long-term resources. Consequently, the average of 75.88 in fixed assets turnover reveals that the average investment leverages revenue significantly. Times interest earned on the average is 885.91 which demonstrates that businesses

are able to repay liability interest. Moreover, this figure shows that companies might be able to obtain more debt.

5.3 CORRELATION ANALYSIS

The correlation analysis identifies the degree of affinity between two variables. If the correlation coefficient (ρ) is high, it might indicate multicollinearity (Gaud et al., 2005). For Jappelli (2010) a correlation of 0.79 (or higher) is considered high. Therefore, variables with this coefficient may lead to multicollinearity. This phenomenon causes misspecification of regression results. Tables 8 and 9 show the results of the Pearson correlation coefficients and Spearman respectively, among the endogenous and exogenous variables. Examination of Table 8 and 9 reveals that the research should not expect any multicollinearity issues according to Jappelli (2010), since the correlation is below 0.79. In general, a reduction in regressor variables augments profitability. The dependant variable profitability is negatively correlated with cash conversion cycle, debt, FAturn, Timinter, and payables period. An increase of the latter is acceptable as prompt payments to suppliers result in discounts for firms.

The remaining variables are positive in direction and small in magnitude. This suggests that in the case of company size, bigger companies with more assets will be more profitable. Finally, a positive times interest earned refers to the possibility that businesses might be willing to have more debt to expand their operations to be more profitable.

5.4 FINANCIAL ECONOMETRICS DISCUSSION

5.4.1 POOLED OLS

Upon examination of the pooled OLS (Table 12 and Table 13) and the fixed effects (FE) regression models (Table 16 and Table 17), it is observed that CCC, accounts receivable and accounts payable have a negative relation with profitability. This implies that reducing CCC and its components will increase profitability; keeping cash reserves low in the firm for a long period can help that company will enhance profits. The intuition behind the results on Table 12 and Table 13 is that μ is constant; there are neither individual nor time effects. Pooled OLS provides consistent and efficient estimators of homogeneous intercept and beta. However, the company-specific effects do not vary in this method; making it restrictive and sometimes impractical. Furthermore, these regressions are prone towards heteroscedasticity between panel companies. Finally, pooled OLS may be affected by serial correlation within panel companies.

5.4.2 RANDOM EFFECTS

In panel data models an intercept is deliberately included, to assume that the unobserved effect has a mean of zero. In fixed effects, the target is to remove the unseen effect, since it is assumed to correlate with an independent variable. However, if the unobserved effect is not correlated with the exogenous variable in any period, then implementing a transformation to remove unobserved effect provides inefficient estimators (Bell and Jones, 2015). Furthermore, a random effects (RE) model assumes that the unseen effect is not correlated with any independent variable.

Upon completion of assumptions, random effects will produce unbiased and efficient (small standard errors) estimators. However, if the model has omitted variables the estimator will be biased. In the presence of omitted variables, these are correlated with variables in the model, then fixed effects are highly recommended to control omitted variable bias.

Tables 14 and 15 show two regression models using random effects. Table 14 describes a model where cash conversion cycle, size, payables period, debt, and CATA explained overall R^2 8.43% of profitability. The study contemplated 322 observations where the variable of interest CCC, neither changed in direction nor fluctuated in magnitude. Moreover, the control variables did not change widely in multiple scenarios. This reveals that the model exhibited in equation 8 might explain the regressand. Table 15 shows an extended model with more explanatory power, including the following regressors: cash conversion cycle, size, payables period, debt, current assets to total assets, working capital to sales, fixed assets turnover, and times interest earned whose R^2 is 20.40%. The number of observations is similar to the previous model and the variable of interest remains invariable. Analogous to the former model the control variables did not change extensively in the scenarios observed. This model is depicted in equation 9. All independent variables from both models are statistically significant.

5.4.3 FIXED EFFECTS

Under the fixed effects (FE) model the individual-specific effect (firms) may be correlated with independent variables. In addition, fixed effects consider that time-varying exogenous variables do not have perfect collinearity and no outliers. Thus, independent variables cannot have a constant or time-invariant variable (Himmelberg et al., 1999). These models have different intercepts, one for each entity. If the model has omitted variables, these will have an impact, regardless of time. Thus, there is a constant effect through time. For the latter to occur, these unobserved variables must have time-invariant figures implying that the value of the variable remains the same through time (i.e., gender and race). Also, time

– invariant effects means that there are some characteristics of the variable that are expected to remain the same through time (i.e. gender and race has the same effect on $t = 1$ or $t = 6$).

The information in Table 16 and Table 17 describe a regression that accepts that beta coefficients are constant for all businesses, but the intercept changes across companies. In FE, changes across companies might be engulfed in differences in the constant. In this model, μ is considered as an unidentified parameter eligible for estimation. Nevertheless, it is advantageous that effects are independent allowing the unobserved individual effects to be correlated with the variables. However, FE cannot estimate the effect of time invariant-variables.

The investigation ran and exhibited both random and fixed effects. However, as per recommendation of the Hausman test (section 4.4.4) it concentrated on fixed effects. Tables 16 and 17 show two statistically significant regression models using fixed effects. For the purposes of analytical comparison, Table 16 shows the same variable as Table 14, and Table 17 uses the same variable as Table 15. The results are summarised and exhibited in equations 10 and 11, respectively. In Table 16, the exogenous variable explains 3.68% as per measurement of R^2 , which is less than the figures shown for its counterpart on table 14. Interestingly, the regressors in table 17 explain only 16.06%, a diminished percentage as well in comparison to random effects. The number of observations on these models remains the same. Similar to the model in Tables 14 and 15, the variable of interest (CCC) and the control variables do not change in direction and magnitude. It is interesting to highlight that, besides CCC, the investigation only found payables period and accounts receivable to be relevant. Inventory was not statistically significant. The information presented in this chapter suggests a negative relation between CCC and profitability, in line with previous investigations (García-Teruel and Martínez-Solano, 2007 and Shin and Soenen, 1998). This means that diminishing working capital (CCC) will augment firm's profitability as predicted by the aggressive policy (Deloof, 2003). The investigation also reveals a negative relation between payable period and profitability in all the models proposed. For Ng et al. (1999), this inverse relation can be explained from the discounts perspective. Companies reduce their accounts payable to cease a given discount for prompt payment, ergo lowering expenses and increasing profitability.

5.4.4 CASH CONVERSION CYCLE

Extant literature recommends return on sales (ROS), return on equity (ROE) and return on assets (ROA) as potential dependent variables. In addition, it suggests CCC as variables of interest. The investigation used profitability since it does not discriminate in terms of capital structure. On the other hand, Table 17 reveals independent variables as well, where CCC was chosen as the variable of interest since this

variable explains better profitability locally. In addition, it provides more robust results from an econometrical perspective. Control variables were used as CCC measures the financial management efficiency considering the time between disbursement and collection of cash. Therefore, on equation 10 and 11 the study controlled for company size and indebtedness, current and fixed asset utilisation. On equation 11, the research used the same variable of interest and control variables as equation 10. Moreover, it expanded the controls using accounts receivables and payables, net working capital turnover and times interest earned.

Table 18 analyses the expected and thesis signs. The variable of interest coefficient was -0.0001 which implies that the smaller the cash conversion cycle is, the higher the return of the company measured by profitability. This is consistent with the prevailing paradigm used in aggressive policy that the smaller the amount of these short term resources; enhances the magnitude of profitability because firms require less financing allocated for working capital (Deloof, 2003; Sen and Oruc, 2009). The finding is consistent with that of Nobanee and AlHajjar (2014), who found that shortening CCC and NTC improves OI/sales. Also, Lazaridis and Tryfonidis (2006), García-Teruel and Martínez-Solano (2007) and Shin and Soenen (1998) found a negative relation between CCC and profitability. It also coincides with findings reported by Enqvist et al. (2014), Sen and Oruc (2009) and Tauringana and Afrifa (2013) who used return on assets and CCC where a negative relation between the previously mentioned variables exists. These results are consistent with hypothesis one.

5.4.5 CONTROL VARIABLES

The investigation used logarithm of assets; the analysis revealed a positive sign, consistent with García-Teruel and Martínez-Solano (2007) and Tauringana and Afrifa (2013), implying that profitability is positively associated with company size; bigger firms tend to be more lucrative. The SIC monitors and regulates the performance of small and medium-sized enterprises (SMEs), and large corporations; it was necessary to control enterprise magnitude using the size variable which is logarithm of assets. In addition, since that regressand does not discriminate for capital structure, it was decided to consider the degree of indebtedness the company has. For Nobanee and AlHajjar (2014) there was no significant relation between the capital structure proxy, debt divided by equity and profitability. However, the findings here concord with those reported by Shin and Soenen (1998), as there is a negative relation between leverage and profitability. This implies that at higher levels of indebtedness; firm profitability diminishes.

Short and long-term asset utilisation in terms of total assets and the rotation of fixed assets was monitored through current assets / total assets (CATA) and fixed assets turnover (FAturn) respectively. The latter is sales divided by fixed assets; this ratio measures fixed assets investment- productivity and efficiency. It quantifies company ability to produce sales per dollar of long-term assets (Stratopoulos and Dehning, 2000). In the context of the investigation, as the dollar return on sales per investment in fixed assets increases, business profitability is diminished. For Taurigana and Afrifa (2013) investigation on SMEs related CATA and ROA negatively. They suggested that profitability of small firms is inversely related to companies with a higher quantity of current assets to total assets. However, in Ecuador the positive coefficient depicts that there is an impact, specifically of 0.079 current assets per dollar of total assets with profitability.

5.4.6 ASSESSMENT OF ENDOGENEITY

In traditional causal models, working capital management (independent variable) explains profitability (dependent variable). Although the overwhelming majority of investigations use the aforementioned variables, the research of Nazir and Afza (2009) describes a statistically significant model where profitability explains working capital management. This is evidence of tangible reverse causality and simultaneity between the aforementioned variable. Furthermore, Hill et al. (2010) mentioned that working capital metrics such as relaxed credit terms and inventory policies might entail reverse causality when they are used for sales growth. This is solved by lagging sales.

For Baños-Caballero et al. (2013) endogeneity might entail the relation between performance and firm-specific characteristics showing both the effect of exogenous variables on firm performance and vice versa. This might occur, since shocks influencing performance might affect other company-specific characteristics. Deloof (2003) concurs as he mentions that a possible endogeneity happens as profitability might be causing working capital management since the negative relation between profitability and payables occurs because less profitable firms delay obligations payment. Similarly, the inverse relation between profitability and inventory might happen due to lower sales which increase inventory. Likewise, the negative relation receivables and profitability could be caused because customers require an extended period to evaluate product quality; diminishing profitability.

5.4.7 RESEARCH CONTRIBUTION TO EXTANT LITERATURE

Although dependent variable, variable of interest and many controls are supported by the literature, the investigation has found new control variables. All regressors in Table 18 except fixed assets turnover

(FAturn) and times interest earned ratio (Timinter) were previously used by authors (see Table 3 and Table 4). These two variables are consistent with hypotheses three and four, and represent the contribution of this thesis to the extant literature. These statistically significant independent variables have never been used to explain profitability.

On equation 11, the research considers the before mentioned new controls. The investigation found that payables period (PP) has a negative relation with profitability. This is in accordance with Deloof (2003), García-Teruel and Martínez-Solano (2007), and Tauringana and Afrifa (2013). They argue that PP management is important, since a decrease in these metrics increases profitability and vice versa. This variable has been used to explain profitability in the investigation of Deloof (2003), García-Teruel and Martínez-Solano (2007), Kieschnick et al. (2013), Sen and Oruc (2009) and Tauringana and Afrifa (2013). The investigation implements Timinter, which depicts the financial strength of companies; denoting the coverage of earnings before interest and taxes per interest paid. This enables a company to address the amount of resources available per unit of interest spent.

Table 9. Expected and thesis signs of variable of interest and control variables used.

Variable	Description	Author	Expected sign	Thesis Sign	Equation	Thesis contribution
CCC	Accounts receivable period + inventories period – accounts payable	Deloof (2003), Sen and Oruc (2009), Nobanee and AlHajjar (2014), Lazaridis and Tryfonidis (2006), Tauringana and Afrifa (2013), Enqvist et al. (2014), García-Teruel and Martínez-Solano (2007)	-	-	4 & 5	No
Size	Logarithm of assets	Tauringana and Afrifa (2013), García-Teruel and Martínez-Solano (2007)	+	-	4 & 5	No
Debt	Total debt / total Assets	Shin and Soenen (1998) Nobanee and AlHajjar (2014)	- No relation	-	4 & 5	No
CATA	Current assets / total Assets	Tauringana and Afrifa (2013)	-	+	4 & 5	No
PP	Payables period (days) = Accounts payables / Cost of goods sold * 365	Kieschnick, et al. (2013) Nobanee and AlHajjar (2014) Deloof (2003) Sen and Oruc (2009) Tauringana and Afrifa (2013) García-Teruel and Martínez-Solano (2007)	-	-	5	No
FATurn	Sales / fixed assets	New variable	N.A.	+	4 & 5	Yes
Timinter	EBIT divided by interest expense	New variable	N.A.	+	5	Yes

The table describes past financial metrics, authors and signs utilized in previous studies. Also, these ratios and their direction are compared and contrasted against the thesis shown in a corresponding equation. Furthermore, the table reveals the contribution this thesis makes as it shows new regressors influencing return on assets. These independent variables are cash conversion cycle (CCC), logarithm of assets (Size), total debt divided by total assets (Debt), current assets divided by total assets (CATA), accounts payables period (PP), sales divided by fixed assets (FATurn) and EBIT divided by interest expense (Timinter).

For Aminu and Zainudin (2015), working capital management is an exchange between liquidity and profitability; where firms choose a particular posture according to company policies. According to Afrifa (2015), this entails a dichotomy between a company employing an aggressive strategy (risk taker) that has lower current assets than fixed assets; or a conservative strategy (risk averse), where the level of current assets is higher than fixed assets. Ching et al. (2011) depict a working capital intensive approach as being adopted by firms that have more than 50% of total assets invested in current assets, whereas the opposite is true for fixed capital intensive companies. Our data reflects that 57% of corporate Ecuadorian firms are working capital intensive, reflecting a conservative strategy.

5.5 CONCLUSION

This chapter has discussed variables of past investigations considering their appropriateness in that local market. The investigation has compared Ecuadorian results from several perspectives against the extant literature, contrasting these findings against the local microeconomic sector. The research has contrasted the expected signs of the coefficients against investigation results, revealing that CCC, debt and PP are in line with the literature while other variables either have the opposite sign or no relation. It has also been observed that the market is working capital intensive prone. Additionally, the investigation narrows down the gap between academic and practitioner discrepancies as it reveals and contributes to the literature by suggesting that FAturn and Timinter are new variables, currently not in the annals of finance explaining profitability.

Having now fully explored the results of the quantitative analysis, in the next chapter there is a full description and discussion of the qualitative analysis required to fulfil the third objective of this work. The fulfilment of this objective entailed examining the process of taking action to effect a change in the financial administration of a real company operating in Ecuador, under the unique conditions that are pertinent to this investigation. Having demonstrated through the quantitative analysis that a reduced cash conversion cycle correlates statistically with an increase in profitability, the findings reported in chapter six lead to a greater understanding of the challenges and benefits of effecting changes in working capital management in this context.

CHAPTER SIX

QUALITATIVE ANALYSIS

6.1 INTRODUCTION

In this chapter I will examine the qualitative analysis conducted to apply financial econometrical results, as an input and a tool to solve the pending problems framed in action research in a real company. Description of several action research (AR) methodological approaches is given, as it is necessary to evaluate which AR method best suits the needs of the company under scrutiny. Action learning in combination with mode two was employed in this case. These methods aided learning from a real life experience on the part of set members of Cronos, a company operating in the real sector as a siderurgical intermediary, with a profitability problem rooted in working capital management. Trans-discipline model two allowed me to use elements from other disciplines: statistics, finance and econometrics, to build a solid foundation of quantitative premises. The investigation proceeded upon these premises in an egalitarian manner, using cycles of AR to learn and ascertain a new course of action. Action research methods were used to examine the process whereby set members extensively debated quantitative statements, decided on a course of action, and observed the results of the action. The outcomes of the process followed by the set during the action rounds in the case of Cronos will be described and discussed. The aim of this discussion is to provide guidelines for financial managers, chief financial officers and general managers on the leading indicators that optimize company performance and the realities of implementing change in the financial management of a company. These recommendations could serve for companies in a similar situation as Cronos who are seeking to optimize their profitability, conditional on working capital management components. The investigation incorporated cause and effect criteria from action research methodology, where causality was determined using financial econometrics tools described herein. These financial metrics (found using OLS) were integrated in a practitioner manner at Cronos. Therefore, it was expected that there would be a significant improvement in company performance measured by working capital management standards (Singh and Pandey, 2008).

In this case, I was employed as a consultant for the company and therefore directed the egalitarian association of international business personnel, accountants, analysts, and managers. I provided guidance without meddling in the participants' democratic-process of cooperation and observed the dynamics contributing to development in the stages of constructing, planning, taking and evaluating

action as depicted in Figure 2 (Adams and McNicholas, 2007). This investigation took place within the specific context of solving an institutional dilemma for Cronos. Action research requires the collaborative efforts of all related stakeholders in and out of the company, to solve the issues and produce actionable knowledge. To achieve this aim, the procedure of questioning had to generate a learning process that promoted individual growth through knowledge for set members, including myself, and the company.

From an academic and practitioner perspective, there is a fierce debate on how accounts receivable, inventories and accounts payables financial strategies differently influence determinants and profitability (see chapter two, section 2.2, 2.3, 2.4 and 2.5). This study aimed to not only provide guidelines for financial managers, chief financial officers and general managers on the leading indicators that optimize company performance, and identify new determinants that help explain profitability in Ecuadorian companies, but also to assist an actual company, Cronos. Although the company had significant revenues (Appendix 9.8.1), their operational performance was rather inefficient, reporting a modest level of net income. The study aimed to integrate financial econometrical findings in a qualitative discussion using action research, an avant-garde concept guiding researchers raising knowledge to solve problems through action. In this case, the action research set members extensively debated quantitative statements within the context of Cronos.

In this section, contemporary perspectives of action research are reviewed.

6.2 GAP IN EXISTING ACTION RESEARCH LITERATURE

Table 1 in chapter two summarizes extant literature from developed countries on the relation between working capital management and profitability. Research reveals that profitability is measured through return on assets and return on equity. The prevailing and primordial variable of interest is cash conversion cycle; even though additional regressors have been highlighted as influential controls in profitability, these do not fully explain regressand. Therefore, the thesis hypothesized that there might be additional financial metrics explaining profitability. These were defined in section 3.5 as hypotheses seven and eight. The current investigation sought to determine these metrics to augment the financial-econometrical comprehension of this phenomenon, which would aid understanding the performance and assist numerous firms in developing dollarized economies.

Table 1 suggests a vast number of plausible variables and regressors to improve company performance. Even though the applicability of variables: cash conversion cycle, size, debt, current assets / total assets and payable period, has been already explored in some depth by other researchers in developed economies (see Table 18 for a summary of important works), it was considered necessary to explore and reaffirm the validity of these variables in an Ecuadorian context. This assertion is based on the fact that Ecuadorian companies are working under a third world dollarized environment, which is a unique situation in the annals of financial research. Studies of working capital management and profitability in South American markets are relatively scarce and investigations on dollarized economies are virtually non-existent. Therefore, the premises on which the existing literature has been based may only have limited applicability in these markets, which may point to a theoretical stance that has not been thoroughly proven in the abovementioned markets up to now.

Moreover, Ecuadorian companies do not seem to be aware that these variables can be used to enhance their financial performance. The exploration of how these variables might contribute to company improvement and how such treatment would be perceived within an Ecuadorian company was considered worthy of further investigation. This type of study has not been reported yet, to the best of my knowledge. Moreover, there is a lack of academic reference for performance enhancement of commodities brokers, specifically siderurgical companies' working capital management and its effect on profitability.

Although I hypothesised that the results of the quantitative analysis would be compelling, this does not necessarily mean that a company would then apply recommendations from a narrow quantitative view. Therefore, the research applied action research in the entire process of investigating, assimilating financial information and subsequent decision-making. This provided a more relevant contribution to the literature, because it provides insight into how data is actually used in a real company setting. Within the previously mentioned context, the investigation uncovers two new statistically significant variables: fixed asset turnover (FATurn) and time interest earned (Timinter). These have been proven so far to contribute explain the regressand within this industry, especially for a dollarized company. The research reported in this thesis suggests that the optimization of fixed asset infrastructure and the maximisation of earnings before interest and taxes per interest paid leads to an enhanced return on assets for siderurgical brokers.

6.3 ACTION RESEARCH APPLICATION

Action research (AR) might be conceived as the process of learning by doing. This technique focuses on a group of individuals scrutinizing, from a research perspective, a social problem. Set members are engaged in learning from the experience of solving a dilemma. After this phase, the researcher has to measure the effect of group's actions. If those are deemed not suitable for company needs, then the set should be able to revise and amend the course of action until the problem is properly solved. Figure 1 depicts how the reviewing and amendment process takes place in iterations, where set members and the researcher exert reflection on the outcome to have improvements on the dilemma before engaging in a new cycle (McKay and Marshall, 2001). Huang (2010) describes the process in similar terms, noting that the key feature lies in the context of action, whereby researchers have to engage with an organisation's practitioners. This partnership with local stakeholders enables discussion and shapes investigation inquiries. The researcher's cycles must exercise action and reflection about the nature of how events are occurring and the impact that the researcher and the set have on the organisation. Bargal (2006) examines the seminal work of Kurt Lewin, noting that for Lewin, action research is a technique that draws on several research methodologies and applies one or more of them during several trials. When first formulated, this approach transformed the way researchers did social sciences. It has multiple applications in education (Mertler, 2016), social issues and management studies and has become an investigation technique for institutional learning (Leitch and Day, 2000). I felt strongly that financial-econometrics formed the cornerstone of Cronos' investigation as this quantitative tool enabled AR set members to have an informed discussion based on premises widely discussed in academia (See literature review sections 2.4, 2.4.1, 2.5, 2.5.1, 2.5.2). Any research discussion will focus on real rather than merely hypothetical applications of findings. Action research is based on cooperative and democratic opinion and inquiry processes. The methodology incorporates practitioners and a researcher steering the discussion in an unbiased manner. Critical to the process is the cyclical systems of identifying and analysing a dilemma framed under the stages of planning, taking action, evaluating action and learning (Sexton and Barrett, 2003), as depicted in Figure 2.

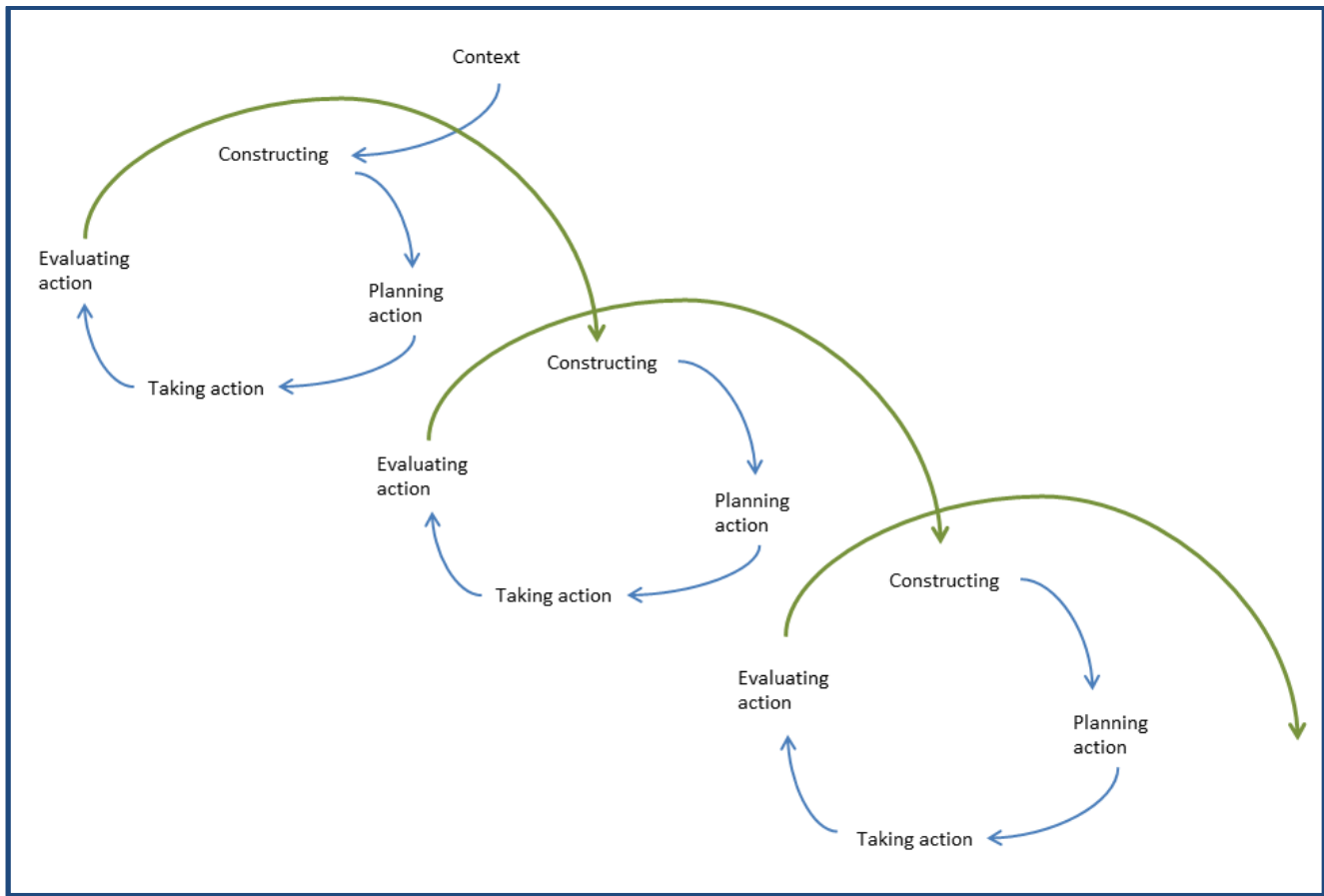


Figure 2 Action research consecutive spirals
Source: Sexton and Barrett (2003).

6.4 ORGANISATIONAL LEARNING GROWTH

Organisational advancement is one of the central aims of action research (Coughlan and Coughlan, 2002). Nearly all action research approaches procure to solve a social matter. Action research intends to connect scholar and practitioner, generating knowledge that is applicable for the further advancement of people and institutions (Canterino et al., 2016). Knowledge creation occurs from the experience of acting in a particular subject. Thus, learning happens through direct understanding and encounters originating with others; these organisational experiences needed for learning must be framed on cycles of reflection of results (Argote and Ingram, 2000; Herbert and Rainford, 2014). Action research helps develop institutions' competences by self-evaluating their current status quo and refining it through participative learning. The latter takes place through successive and continuous interventions enabling change. In the current dynamic institutional environment, organisational readiness and willingness for a steady change

is essential as opposed to performing routine changes; otherwise institutional status quo will persevere (Tsoukas and Chia, 2002).

6.5 ACTION RESEARCH TAXONOMY

The taxonomy of action research is very rich and illustrative. Action research is perceived as a transdisciplinary method designed to create strategies to solve problems. To that end, collaboration among set members from different disciplines is primordial to implement unique strategies in a particular area of academia (Stokols, 2006). Industrial action research is steered by a researcher in collaboration with social scientists and company members. The technique strives for a democratisation of the investigation, following the pattern of participatory research. However, this technique is different from action sciences as it focuses on reflection and the urgency for wider institutional and social change. It emphasizes social institutional schemes like improvement of institutional effectiveness and workers' relationships.

Action science raises knowledge from the mutual interaction between academic institutional psychology and organisational problems. Interestingly, action science is a form of action research that bridges social research and social practice by enacting premises explaining social phenomena, observing scientific primordial criteria (Seo, 2003). It highlights two kinds of learning: formal knowledge, which is the literacy all professionals are instructed in, and the professional knowledge of interpretation and enactment. A different approach was taken by Revans (Pedler et al., 2005), an advocate of action learning, who noticed that the usual management inquiries were ineffective. The main idea behind this method is institutional efficacy and efficiency, bringing individuals together to learn from their experiences. This technique emphasizes analysing a problematic situation of individuals and elucidating what the organisation is trying to accomplish by solving problems. Pedler et al. (2005) and Pérez et al. (2010) state that action learning is commonly used in education as it develops problem solving abilities applied towards academia, corporations and institutions. It analyses the dynamics and alternatives of a problem, embracing and implementing solutions from set members, who learn from the results. Soft systems were embarked in a different path; these were embraced by organisations using the hard systems, like industrial manufacturing and engineering sciences. The outsider researcher has the role of partner in a real conundrum, where the investigator collaborates with company members elaborating a model of the situation which must be contrasted against preconceived models, where set members suggests new strategies to achieve a predetermined model (Checkland, 2011). As an outsider consultant I employed

action learning to solve a real life company conundrum and learn from their involvement, using sophisticated quantitative methods as the foundation for data discussion. Participatory research is often related with social transformation, development and discussion of philosophical ideas. This technique involves a common ownership of investigation ideas, communal examination of social problems and an alignment towards public action.

Classroom action research uses qualitative and explanatory questioning modes of information collection by teachers, where educators' enquiry how to improve their own methods. This method is not idealistic or theoretical but rather seeks practical reasoning on how to proceed properly in a given circumstance. Mettetal (2012) advocates this technique as a way to determine what methodology best suits a teacher and classroom to improve learning. Considering that every teaching circumstance is inimitable, in terms of the topics, level and scholar's abilities, instructors must determine what works best considering the situation given. This need allowed critical participatory action research to evolve, initially as the by-product of an earlier non-successful action research technique used in education (Goodnough, 2010). This earlier version did not consider the link between education and social change and received a strong critique in industrialized societies with disempowerment and social injustice. Critical participatory action research is also a critique of traditional action research where individuals create outgoing spaces and partake in these public ambiances to clarify concerns supporting participants change in practices and generating solidarity (Ottosson, 2003; Ozanne and Saatcioglu, 2008).

Action research is a complex system of research combining multiple methodologies. These methods employed are suited according to the specific needs of a given organisational context and have been ratified in the social sciences under the lens of pragmatic research construct. Pragmatism implies observing the environment as a complex multilayer reality with different worldviews, where agents in these different dimensions are interacting. Moreover, pragmatism views theory and action as a singular event, where axioms are perceived as tools empowering a socially developed construct (Baskerville and Myers, 2004). After identifying needs, taking and amending actions, a report must be produced to inform set members, employees and company representatives (Heikkinen et al., 2007).

This methodology utilizes a human cognition process to maximize resources and control the factors steering to competitive advantage (Kaplan, 2006). This qualitative model permits the research to gain a profound meaning by acknowledging a myriad of perspectives of multiple company stakeholders instead of a single individual. This is combined with double loop learning (Argyris, 2002; Mitchell et al., 2012)

where firm's paradigms and enigmas are examined, in collaboration with other individual perspectives. This is conditional to a set of constraints of additional agents such as regulatory institutions, which have altered the context using interpersonal relationships and team dynamics. Inputs of the aforementioned stakeholders are introduced to deliver a progressive change in the improvement of both quality and business performance, accomplishing a new level of firm knowledge. For Adams and McNicholas (2007) and Sexton and Barrett (2003) the action research process begins during the constructing stage. This is a phase where the initial diagnosis takes place (Figure 2). The investigation will provide the adequate context and explain the goal and plausible solutions.

6.6 ACTION RESEARCH PROBLEMATIZING: CRONOS MILIEU

Cronos was a family owned siderurgical broker with four shareholders. Upper management is represented by a general manager, three managers: logistics, international business, finance and a legal advisor. Additionally, the company had seven business intelligence analysts working in the following areas: finance, marketing, international business (two analysts), logistics (two analysts) and IT. Operating activities were supported and recorded in the accounting department composed of three accountants and an accounting manager.

The firm had been struggling for years due to shortcomings on its management decisions. Financial statements (Appendix 9.8.1) examined in the action research set meeting revealed that although the company has an adequate level of revenue, \$19,523,981, company executives raised doubts regarding the firm's future. Furthermore, set members jointly manifested their worrisome company perspective. The company was not as profitable as its net income of \$3,078.685 reports. This had an impact since the most liquid asset (cash) shows a balance of \$ -23,887.835 in the free cash flow. Set members believed that the organisation was not operating with an efficient cost and expense structure. In the action research meeting, upon close examination of past periods balance sheets, abnormal balances were highlighted. This, according to set members, was due to a failure of the management team to take correct decisions regarding short term accounts and resources. Balance sheet accounts in appendix 9.8.1 reflect that organisational resources were concentrated on the short term, but worse yet this reflected a stagnant financial position (Figure 3). The status quo had created a conundrum among company representatives and stakeholders. The action research set was convened to discuss the firm's condition and achieve a positive outcome, stated as:

A strategic working capital management improvement to enhance Cronos profitability.

6.7 CYCLE ONE

In the following sections, the process followed in cycle one will be described. Cronos set members gained *experience* regarding the status quo of the company through analysis of financial statements (see appendix 9) and ratios (Figure 4). The organisational problem and findings from my literature review were discussed. Set members were also informed about the standards that firms employ to augment profitability. This led to a greater *understanding* amongst set members which allowed them to inquire and receive insight on company results; noticing that there is a constant element: profit stagnation. This inhibited firm growth and professional development; which is the leitmotiv verified through time. Next, a corroboration-oriented inquiry ascertained the accuracy of facts. Set members reviewed financial statements (appendix 9) and they acknowledged company results, yet they queried if these figures were indeed correct and common for all companies. Further reflection of evidence to determine whether this insight fits the commonality revealed that the data for Cronos was not usual. In the phase, known as *judgement* it was revealed that the firm's results are an anomaly among companies in the economy (Table 19).

Table 10. Financial performance summary of Cronos and corporate segment.

Financial metric	Cronos	μ corporate segment manufacturing and steel	Δ
Sales	\$19,523,981	\$19,899,637	\$375,656
Gross profit	\$7,888,090	\$8,452,563	\$564,473
Earnings Before Interest and Taxes (EBIT)	\$6,405,219	\$7,016,529	\$611,310
Net Income	\$3,078,685	\$3,509,701	\$431,016

Table 19. Compares and contrasts the financial results of Cronos conservative strategy against the corporate segment manufacturing iron and steel Ecuadorian companies. It also calculates the variation between the company and the sample.

6.7.1 ACTION RESEARCH CYCLE ONE: MAPPING THE TERRAIN, CONSTRUCTING STEP

Upon being contacted by the company, seeking a solution to their problem, I proceeded to follow the four-part process described by Rock and Levin. (2002). I first set out to gather data to inform what action was needed. This required a benchmark analysis, drawing on the financial metrics portrayed in chapter four. Reflection meetings then took place with set members to further understand the relevance of the problem at stake, which was determined to be of the utmost relevance for the long-term endurance of the firm. This stage required a review of the extant literature (see sections 2.3, 2.4, 2.5). The literature recommends that to increase profitability firms may embrace a conservative policy where current assets increase in accounts receivables and inventory. When this takes place more revenue and profitability is expected. Current assets of companies that employ this approach use fewer current liabilities and additional long-term debt. It is also plausible that business may implement an aggressive strategy where companies minimize inventories and therefore adopt a conservative credit policy with fewer accounts receivable. These companies' assets are financed with additional current liabilities and a lesser amount of long-term liability. The academic consensus of authors reviewed in sections 2.3, 2.4, 2.5 recommends adopting an aggressive policy.

The combination of the recommendations from the literature and the benchmark analysis convinced me of the action that was required for Cronos. I then had to convince the upper management and shareholders. In subsections 6.9.1 and 6.9.2, the actions undertaken to achieve this will be fully described.

During the action research set meetings, I presented and explained my financial econometric research based on eight hypotheses. I also showed the results for local companies in equations 10 and 11 and Table 16 and Table 17 referred to in chapter four. Cronos set members compared and contrasted these equations against company figures in multiple meetings throughout 2016 and 2017; this is what Zuber-Skerritt and Perry (2002) referred to as cycles of reflection.

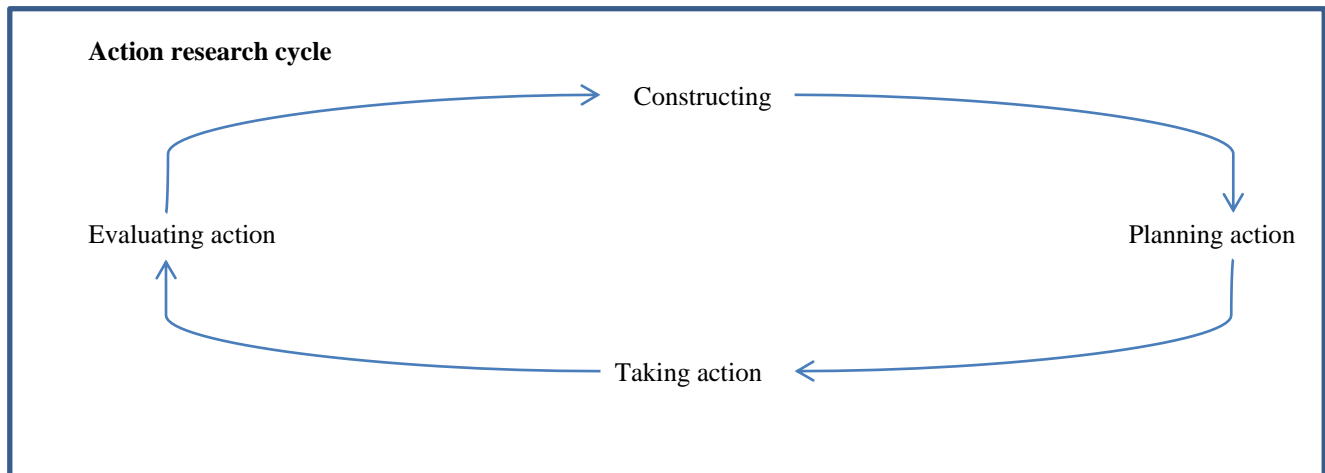


Figure 1 The action research cycle
Source: Sexton and Barrett (2003)

6.7.2 ACTION RESEARCH CYCLE ONE: PLANNING.

I needed to understand the collective knowledge and individual perspectives of the set members. Therefore, written questionnaires and interviews were applied. The survey results revealed that on average, company employees were 31 years old, had a Bachelor's degree, and worked as accountants, analysts or managers. They had 2 years of professional experience in their current position and 6 years of overall experience. Set members did not give priority to any element of working capital management and their responses indicated that the main factor for that decision was the lack of experience and a deficit in academic knowledge regarding working capital management. The accountants' working practice involved a rather mechanical operation of recording figures in the system with limited or no analysis or importance given to the balances. The Accountant General, the logistics and international business managers had a wider view and upon analysis of account balances their perspective was that more is better, meaning that enlarged accounts made a stronger resourceful firm in accordance to the conservative theory (García-Teruel and Martínez-Solano, 2007) They also reported that their information technology skills require fine tuning. Furthermore, every single aspect of the hypotheses was analysed. Thus the survey reveals that factors like cash conversion cycle, debt, FAturn, Timinter, accounts payable period, and CATA were not considered important determinants of financial performance by employees. However, the most relevant factors were company size and accounts receivable period. Similarly, when Cronos collaborators were asked about the relevance of these factors to increase profitability, it was mentioned that size and accounts receivables period were valuable and the remaining metrics were not. Interestingly, when set members were asked if the firm designates a

specific threshold to be preserved and if the firm revises the level of the ratios discussed regularly it was revealed that mostly neither employees nor management/the executive team review these metrics. However, in the action research meetings set members elucidated two accounts related to two metrics. They highlighted that there were two exceptions; firm executives procure due to liquidity concerns to review the balance in dollars of accounts receivables and accounts payables. Also, they try to manage a particular threshold, without a specific target for these accounts.

Interviews with accountants enabled me to understand the operational status quo and difficulties in the accounting and operational daily routines. These processes required coordination and orientation from the general accountant. Inquiries with analysts and managers allowed me to understand planning and evaluating stages of the company, where an emphasis on both local and international operations for acquiring and selling metallurgic material was observed; little or no attention on the impact of financial metrics was perceived.

6.7.3 ACTION ON THE FIRST CYCLE

My involvement in the first cycle was to convince set members that taking a specific course of action was in their best interests. Set members promptly answered inquiries from appendix 9.9.1, 9.9.2 and 9.9.3. Since they are accountancy and business professionals, they were familiar with the questionnaire. However, they were not acquainted with cash conversion cycle. Moreover, in the interviews it was noticeable that Cronos staff did not fully comprehend questions pertaining to the relation of size, accounts receivable, accounts payable, debt and profitability. The missing knowledge allowed me to understand the employees' incomplete financial background (Prior and Argandoña, 2009). The action research sessions revealed a standard knowledge of accountancy and some basic level of finance. The ambience around the AR set was tainted with an aura of acceptance-rejection. The majority of set members accepted the presence of an external researcher perceived as personification of hope. However, there was initial natural rejection towards full disclosure of commercial-financial historical data. Eventually the expertise I was able to show generated trust and the AR set developed communal rapport (DiCicco-Bloom and Crabtree, 2006).

The action relied on a thorough understanding on the financial status quo of the firm. This required me to ask set members to perform an in-depth analysis of financial figures. The communal cooperation of set members, involved asking the three accountant assistants to work on both income statement and balance sheet (see Appendix 9.8.1) common size statement. Additionally, the accountant manager

performed the free cash flow. Finally, I was in charge of financial ratios. Upon completion of these tasks, the AR set gathered to discuss the financial analysis tools mentioned in an egalitarian manner.

I presented a benchmark comparison (Table 19) revealing the performance metrics of Cronos against the corporate sector. These figures exhibited a company moderately profitable, yet underperforming due to inadequate management. The Cronos management response to the data shown, revolved around a profound sense of change. Willingness and hope that the current status quo could be improved resounded among executives. They had high expectations as they firmly believed in a company with a great potential. Modifications implied a revolutionary change in the collective paradigm of personnel and company culture. However, resistance to change was notorious as questions and body language among management manifested an aura of scepticism regarding my premises surrounding the proposed changes. As the discussion became overheated the general manager exhorted executives to exercise suspension of disbelief. Management members disconnected from conventional business paradigms, expecting to reframe their ideas and looking forward for new axioms. I explained from a different angle the figures of Table 19, which were backed up by balance sheet, income statement and cash flow figures. For the general accountant and commercial manager, the balances of account receivables \$16,989,965, inventories \$28,895,632 and accounts payables \$9,545,968 of December 2015 (Appendix 9.8.1) reflected the source of the firm's strength as they believed that more resources represented a robust and prominent company expected to generate more sales. However, for me this perspective was flawed as company potential should not be assessed on asset value, but from the cash flow originated from assets (Raheman and Nasr, 2007). Additionally, I highlighted that hitherto company *modus operandi* for both executives and employees depicted a conservative strategy (Garcia-Teruel and Martinez-Solano, 2007) around a construct dictating a limited Cronos performance of sales \$19,523,981, earnings before interest and taxes (EBIT) \$6,405,219 net income \$3,078,685. Thus from a practitioner's perspective, the latter was incorrectly perceived as an organisational achievement, due to the fact that the business was reporting apparently healthy figures. Cronos' management response to this proposition indicated a fear of change. This is one of the most basic human reactions and occurs on the grounds that changing paradigms in the human psyche takes significant effort.

In order to show that the perception of healthy performance did not have academic validity, I firstly showed that although the company is profitable, benchmark figures (against corporate peers) demonstrated that company was underperforming, implying that there was an opportunity cost and the

business might yield more if it were to be steered according to adequate financial axioms. Secondly, I backed up these arguments by highlighting the morbidly exaggerated cash conversion cycle of 925 days, which only yielded a return on assets (ROA) of 6.50%; an indication that the business was inadequately managing its resources since the process of investing in merchandise, collecting receivables and disbursing payables was taking too long. This metric became obvious upon comparison against that of its peers, whose average was 91 days. Furthermore, an extended cycle of 925 days implied that Cronos required a greater requirement for external financing and thus additional funds and interest expense to finance these assets (Abuzar, 2004; Garcia-Teruel and Martinez-Solano, 2007) (section 9.8.1).

The cycle of reflection unveiled the diagnostic of the firm. Through financial analysis, questionnaires and interviews conducted with Cronos employees in the first cycle, it was ascertained that, within the context of the literature review. Cronos is using a conservative approach. Firms implementing this strategy increase their accounts receivables significantly; companies finance these assets with less current liabilities and more long-term obligations (García-Teruel and Martínez-Solano, 2007). Cronos balance sheet figures (appendix 9.8.1) showed enlarged balances on accounts receivables \$16,989,965 (represents 35.87% of total assets) and inventories \$28,895,632 (represents 61% of total assets). The company employed more long-term debt \$34,901,523 (73.68%) than current liabilities \$10,477,943 (22.12%), the use of more long-term than short-term financing is concordant for companies employing a conservative strategy for Afrifa (2015).

The outcome of the first phase of action undertaken was to fully explore the context of the problem investigated. This occurred in collaboration with set members. The Cronos investigation encompassed several meetings of ample and enriched discussions. The reflection phase of the first cycle took place with company meetings steered by the leading investigator. My analysis observed that although the accountants and analysts are indeed professionals, the knowledge they possess is quite empirical and, in my opinion, they lacked adequate academic knowledge. Therefore, I explained the nature of H1 cash conversion cycle and its components. Furthermore, I also explained the differences between assets and liabilities management of aggressive and conservative financial policies (section 2.2, 2.3 and 2.4). Set members questioned the current stance of the company reflecting on past actions leading to the critical present. This process revealed that set members concurred in the staggering opportunity cost as net income presents a severely minimized balance compared to sales. That situation might have put Cronos at peril since Aminu and Zainudin (2015) and Samiloglu and Dermigunes (2008) have noted that even

firms with relevant revenues but mismanaged working capital might become less profitable and in the worst scenarios, file for bankruptcy. In section 6.7.4 and 6.7.5, the decisions and actions taken by the set members at the culmination of the first cycle are explained.

6.7.4 ACTION RESEARCH CYCLE ONE: EVALUATION.

In the first cycle, the action was the responses of set members to fully comprehend the situation or problem. In interviews and meetings with the Cronos staff, it was highlighted that there was a lack of understanding about the reasons behind company underperformance. For set members it was illogical that, despite a good level of sales, the company was not profitable enough compared to its peers (Table 19). Ergo, action was required. I inquired about the status of financial metrics. Set members replied that they lagged behind on financial statements delivery, and financial analysis was (almost) non-existent. It became imperative to perform financial analysis to ascertain the financial status quo of Cronos.

The first cycle represents the process required to convince the set to take the action I had recommended. From the first cycle, set members learnt that financial analysis on balance sheet and income statement (appendix 9.8.1) is fundamental. Common size statement, free cash flow and ratio analysis depict the financial stance of the company. More deficiencies in Cronos' performance were identified when this tool was incorporated into the benchmark comparison against peer companies (Table 19).

6.7.5 FINDINGS OF CYCLE ONE: BENCHMARK ANALYSIS OF CRONOS

Section 3.3 provides an explicit guideline to properly discriminate in terms of firm size as per Superintendence of Companies (SIC) regulations. Upon analysis of Cronos' financial figures (Appendix 9.8.1); it can be seen that the firm belongs to the corporate sector as its volume of sales surpasses \$5,000,000. Therefore, in order to focus on firms with similar characteristics (the peers of the corporate segment manufacturing iron and steel) the sample examined was of 46 companies from an overall total of 19,894 firms registered with the SIC.

Comparison of Cronos' figures against this benchmark revealed overwhelmingly higher than corporate μ figures. However, the logarithmic assets describing company size favours Cronos. From a financial stance Cronos reports ample divergence against μ of corporate businesses as every single figure except for size and payables period (PP) in Table 20 reflects an inadequate balance against other firms' figures. Comparison of cash conversion cycle (CCC) and return on assets (ROA) in Table 20, shows an augmented 916% and ROA reveals a severely diminished 18.05%. It can be understood that the exacerbated 925 days in CCC severely affects profitability and the relation between profitability and the

working capital mentioned by García-Teruel and Martínez-Solano (2007), and Lazaridis and Tryfonidis (2006) does not hold under the current structure. An analysis of its components supports this assertion, since Cronos receivables and payables variation is 341% and 202% respectively, which is significantly higher than the expected value (μ). Although firms in the corporate sector finance their assets with debt (57.51%), Cronos surpassed the average of local firms by a large margin (95.80%). As the firm was highly leveraged, almost nine out of ten dollars were financed with liabilities. This meant that the company was in peril; since higher debt entails more risk. Perception of these above normal levels might induce companies to delay their payables (Carter and Van Aukun, 2005), and indeed the 299 days in accounts payables epitomized the aforementioned liabilities delay. However, a payables period which was larger than its peers favoured Cronos since an elongated period of payables enhances return on assets, as has been noted by Deloof (2003), García-Teruel and Martínez-Solano (2010), and Nobanee et al. (2011).

Since short-term assets are bigger than long-term assets (appendix 9.8.1) this company followed a conservative strategy (Afrifa, 2015; García-Teruel and Martínez-Solano, 2007). This involves less profitability and an opportunity cost due to its large balances. The use of current assets divided by total assets as a control variable confirms that Cronos was implementing this strategy. Additionally, this metric is an asset turnover depicting asset usage and profit margin. The fact that the company used significantly more current assets compared to its peers ratified that firm asset underutilisation explains a lower return on assets.

Action research exerts on the researcher an introspective reflective phase; therefore, after analysing the financial metrics previously discussed it was deemed necessary to explore and incorporate control variables (section 3.5.1) in H2 to H8 in the second action research cycle. This might favourably contribute the variable of interest that helps explain profitability in local companies.

Table 20. Cronos and corporate segment financial metrics.

Financial metric	Abbreviation	Cronos	μ corporate segment manufacturing and steel	Δ
Profitability	ROA	6.50%	11%	
Cash conversion cycle	CCC	925	91	
Size	Size	18	16	10%
Payables period	PP	299	75	299%
Debt	Debt	95.80%	57.51%	
Current assets divided by total assets	CATA	98.19%	69.78%	
Working capital to sales	WCSales	184.56%	12.68%	
Net trade cycle	NTC	93	71.23	31%
Fixed asset turnover	Faturn	23	75.88	-70%
Equity multiplier	EquityMultip	23.82	7.11	235%
Times interest ratio	Timinter	2.61	885	-100%

Table 20. Compares and contrasts the key financial ratios of Cronos conservative strategy against the financial econometric outcome of the corporate segment manufacturing iron and steel Ecuadorian companies. It also calculates the variation between the company and the sample.

6.8 QUALITATIVE RESEARCH QUESTION

After examination of the quantitative evidence it was necessary to state an investigation inquiry for Cronos. Given the current status quo, which financial strategy on working capital should be employed to increase profitability? My hypothesis, which the set agreed to test was that a reduction in cash conversion cycle would increase profitability in Cronos, in line with the recommendations provided in the literature.

6.9 CYCLE TWO

6.9.1 ACTION RESEARCH CYCLE TWO: CONSTRUCTING

From a financial econometrical perspective, H1 in the company under scrutiny had to be influenced by control variables, thus financial metrics in H2 to H8 had to be analysed as well under the context of Cronos. These issues were explored by the set in further meetings in 2016. Moreover, the following topics were explored in more detail (they had previously been subject to discussion in focus groups): 1) Examination of cash conversion cycle as a metric of short term financial efficiency in Cronos. 2) Effectiveness of cash conversion cycle components, specifically, accounts receivable and accounts payable period in days as metrics for collection and disbursements. In addition, set members analysed whether the control variables (H2 – H8) play a relevant role. Thus H1 – H8 were established as objectives as part of the agenda of inquiries for the second round interviews. Surveys were again used to gather data, the research used statistical methods for its analysis. The objective behind selecting this method was to specify which of the factors highlighted in the literature review and in the interviews might assist Cronos in achieving its organisational goals.

6.9.2 ACTION RESEARCH CYCLE TWO: ACTION RESEARCH DISCUSSION: CRONOS PAST PERFORMANCE

I conducted a survey based on the metrics identified from the literature review. These were considered relevant for financial and organisational development. The objective was to gain a profound comprehension of financial management of a siderurgical broker.

The set member's cycle of learning in action involved comparing and contrasting Cronos's financial results against the mean of companies (see Table 20). Set members concurred that the company's opportunity cost lay in profound company mismanagement. Lack of proper turnover in current assets and liabilities, specifically receivables, inventories and payables were identified as the main reasons for the debacle. Cronos set members realized the importance and correlation that cash conversion cycle components have on a contracted profitability, a key metric since a small net income did not justify the investment in existing assets.

Set members concurred with the view that the company had followed a conservative working capital strategy. Cronos had a high ratio of current assets to sales; for every dollar of sales the firm had 2.38 dollars in current assets. There was a high level of net working capital \$36,033,968 and a high level of liquidity; cash balance was \$315,289. For Afrifa (2015) and García-Teruel and Martínez-Solano (2007)

companies with large inventory and accounts receivables \$28,895,632 and \$16,989,965 respectively implement a conservative strategy where the level of current assets is higher than fixed assets. These assets are moderately financed with current liabilities \$10,477,943 and significantly financed with long-term debt \$34,901,523. Liabilities term structure employs more long-term liabilities and less short-term debt, which, according to Nazir and Afza (2009), are characteristics of conservative financing policy. In addition, Cronos' cash conversion cycle, inventory and receivables had a positive relation with profitability. Accordingly, accounts payable and profitability have a negative relation. For Tauringana and Afrifa (2013) these are traits of a conservative strategy.

The action research project was supported by quantitative tools that enriched the set member's discussion. The panel data regression with fixed effects through quantitative means provided tools that corroborated and explained the precarious state of current assets and liabilities, determinants which in turn explain the weakened position of Cronos. Company cash conversion cycle was staggeringly high; it took 925 days for the firm to acquire inventory, selling on credit and pay its suppliers. The average company has only 91 days. This dreadful figure epitomized the precarious stance of the firm as the opportunity cost in current assets impedes proper company management. This had a blunt financial effect repercussion according to the literature in profitability, as return on assets was 6.50% lower than 11.55% of the average company. Working capital components were not properly managed either. The accounts receivables period was 318 days whereas firms in the SIC records had 72 days on average. Cronos' inventories management had 906 days whilst the company mean only had 118 days. Payables period was one of the few metrics adequately managed. Cronos paid in 299 days compared to a 75-day average.

Besides payables, another financial metric that showed a positive result was assets management divided by total assets (CATA); the result was 98.19%, surpassing the system mean of 69%. On the other hand, investment in fixed assets measured by sales divided by fixed assets (Faturn) was 23 times; average companies had 75 times implying that the traditional firm obtained 70% more than Cronos. The investment in working capital was undervalued. It only rendered 0.54 dollars of revenue vs. 1.99 company average. Furthermore, controls studied implied that Cronos had an overstated and asymmetrical debt-equity relation where total liabilities finance 95.80% of assets; exceeding the capital structure standards. Firms on average used 57%. This was consistent with Shin and Soenen (1998); the inverse relation between Cronos's net income and working capital management is explained by higher

levels of indebtedness diminishing earnings before interest and taxes (EBIT) capacity to pay interest expense to 2.61 as measured by times interest earned ratio (Timinter), whereas companies on average may obtain 885 times more financing.

6.9.3 REFLECTION STAGE ACTION RESEARCH CYCLE TWO

The second cycle brought forth relevant insights and raised new inquiries. Initial hypotheses were in accordance with the literature review. Some of the results from set member's interviews were in accordance with the academic stance described earlier, whilst other answers were different. Since the number of employees at Cronos was small, the research employed a written survey (see appendix 10); this revealed relevant implications and noteworthy findings. Implementation of financial-econometrics methods to the problem at stake transcends the normal purpose of action research. Additionally, use of quantitative investigation on an action research project produced specific revelations within the context and presented new insights to contemporary working capital management and profitability. The outcome obtained from action research cycle two was pertinent to the thesis. In addition, it is imperative to get an indication of the outcome relevant for the company under surveillance.

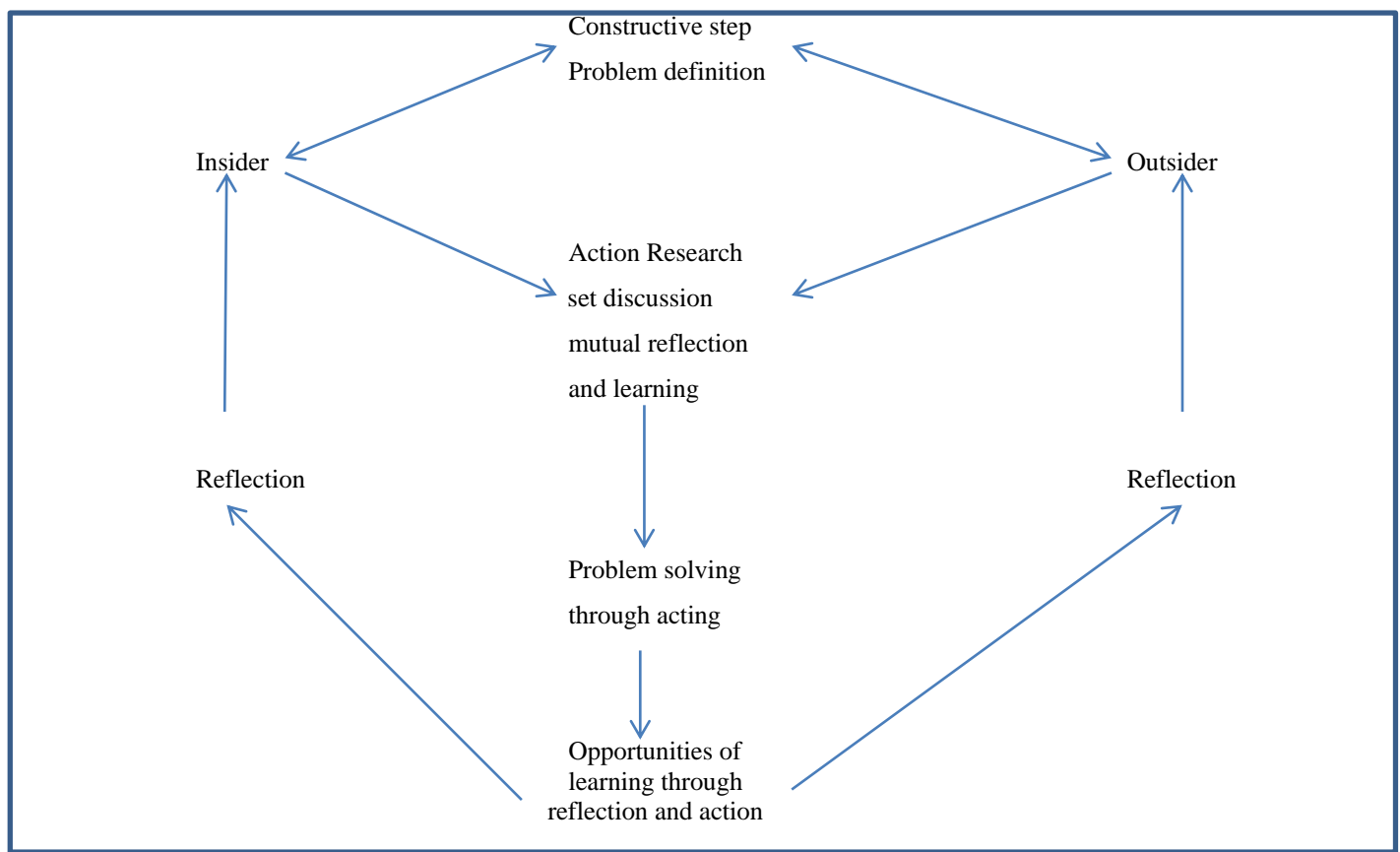


Figure 2 Cogenerative action research model
Source: Argyris (2002)

6.9.4 ACTION RESEARCH CYCLE TWO: TAKING ACTION STAGE: TESTING

PLAUSIBILITY

The current investigation was active for more than two years from 1 October 2015. The research represented a paramount challenge as it amalgamated financial econometrical methods into a qualitative methodology to provide solutions for a commodities mercantile business. The thesis postulated solutions which required time for implementation and assessment. While set members vigorously contributed with pertinent inquiries and suggestions, I proposed some of the solutions drawing on my knowledge and experience.

The learning process of both Cronos employees and myself was the solid foundation of the qualitative investigation. The participative and inclusive qualitative methodology described earlier gave preference to personal knowledge. I demonstrated my willingness to receive criticism on my academic theories, by allowing set members to debate both financial axioms and my financial econometric findings. There are many ways to engage in qualitative research, each containing different ways to collect data. This may be achieved by the researcher separating data collection in different cycles with unique approaches in each cycle (Brown, 2010). Contrasting information from the literature review and the internal feedback from the survey conducted with action research set members along with the interviews became a vital step to understand the institutional dilemma. Interviews uncovered information beyond the traditional academic thresholds, furthermore, the methodological approach of trans-disciplinary mode two provided in-depth knowledge to elucidate company status quo and delivered solutions to mitigate the current condition. Action research set members gathered to discuss the feasible options to optimize working capital and enhance company profits.

The reflection stage permits set members and the researcher to analyse in an introspective manner the events, discussions and ideas enacted earlier by company set members (Baum et al., 2006). The action was accomplished through the reflective stage (Baum et al., 2006) of cycle one where set members analysed the available information to define what action ought to be followed. It was accepted that company results were below the average figures for Ecuadorian firms obtained in the quantitative analysis (Table 20) Cronos employees and representatives' deficit of proper academic knowledge had led them to believe that vast amounts of merchandise and consequently increased accounts receivables were better in terms of profitability (a conservative approach).

Therefore, the action in the first cycle was twofold 1) It focused my attention in explaining the financial premises behind H1, H7 and the effect they have on Cronos's performance. 2) As a *sine qua non* condition it was primordial for set members to comprehend the nature of H1 cash conversion cycle and its components H7 accounts payables period. Following the belief that understanding of these axioms and prospective change in financial planning steering towards the completion of an aggressive policy will increase profitability as mentioned in section 2.3, 2.4 and 2.5. Furthermore, since the conservative policy has led the company to the current status I noticed the need to elucidate to set members the relevance, difference and consequences of, assets and liabilities management of aggressive and conservative financial policies (section 3.4). Previous premises are complemented by set member acknowledgment of control variables (section 3.4.1) as new metrics to explain profitability in local companies.

The outcome of cycle one served as input for the following cycle, where the reflection stage of cycle two manifests that the new action must be based on Cronos set member's discussion of 1) Financial econometric results and 2) Change current company strategies to implement a financial aggressive policy. Set members conveyed that inventory period (IP) and H7 payables period (PP) financial ratios must be optimized promptly, following the recommendation of Enqvist et al. (2014); García-Teruel and Martínez-Solano (2007). Both accounts receivables period and inventory period in days must be reduced whereas payables period might be elongated without legal repercussions. This would diminish cash conversion cycle expecting an increase in company's return on assets. The previous is intertwined with net working capital turnover improvement as both working capital and sales will be enhanced. Finally, set members believed that reframing capital structure will not only redistribute shareholders' involvement in the form of equity participation, but as liabilities financing diminish so will interest expense and therefore enhance times interest earned ratio.

Moreover, to mitigate the threats described earlier set members recommended the following three step action process. 1) To engage in short term contracts that can easily adapt to ever changing needs and prices of the market. Additionally, it was suggested to match these selling prices to the acquisition prices on a per contact (customer) basis to increase profitability. 2) To ascertain a position on the acquisition price I suggested engaging in a long position in the financial derivatives markets from the Chicago Board Of Trade (CBOT). These instruments would predetermine a specific price in advance for the price of steel, thus eliminating price uncertainty (Vashishtha and Kumar, 2010). A decision had to be made

between the exact instrument to be acquired: either a forward or a future contract. A future contract is a highly standardized contract, whose profits are marked to market, profits are daily settled. In contrast, forward contracts are not highly standardized contracts (therefore contracts are tailor made to needs of customers), and profits are not marked to market. Due to the nature of the business, it was highly recommended that Cronos engage in a forward contract since specific quantities are not certain and cannot be known in advance (Lee et al., 2014). In addition, to determine a proper selling price for customers and to realize profit margins set members recommended analysing international prices. There are several references for metal commodity exchanges such as the New York Mercantile Exchange, London Metal Exchange, Deutsche Börse / Eurex 3) The use of local commercial banking services were needed and these had limitations due to the intrinsic risk prone circumstances. To mitigate risks, the overwhelming majority of local banks have become conservative with a short-term outlook to adapt to the ever-changing political and economic conditions. Thus, banks limit the scope and degree of risk in terms of amounts in financial services. Therefore, Cronos set members suggested alternative sources of financing. Company managers, shareholders and I considered potential international suppliers of credit, among them American Capital Financial Group, Capital Funding Group, VII Capital Funds and Caye International Bank Limited among others.

Cronos action research set members assimilated and understood the purpose of cash conversion cycle and financial metrics. Accountants, IT, finance, business and logistics analysts gained a thorough comprehension of aggressive working capital policy (section 2.2 and 2.3) its components and the mechanics to enhance company profitability. Through organisational learning, set members understood that by changing Cronos *modus operandi* from a conservative to an aggressive working capital policy the reduction in accounts receivables, inventories and elongation in accounts payables shortened Cronos cash conversion cycle of selling on credit to major metallurgical industrial companies, collecting receivables and paying to its overseas industrial suppliers and thus enhancing profitability. Furthermore, as I pointed out, the thesis contributed to other areas of company improvement. The thesis corroborates extant financial variables like size, debt, current assets / total assets (Table 17) accounts receivables period and accounts payables period. These variables suggest that smaller, with less debt, higher current assets turnover and smaller receivables companies will increase their profitability.

The decision of Cronos management revolved around the by-product of action research meetings. The firm implemented a series of corporate changes leading to the implementation of “Cronos working

capital policies”. These are defined as company decisions referring to Crono’s goals with regard to the optimum amount of current assets and how these will be financed. For Fracassia (2017) corporate financial policies are critical since these dictate the level of investment in research and development as well as decisions about cash management and financing. Moreover, according to Ferris et al. (2017), peer relations among managers influence managerial decision on firms. In addition, social capital exerts influence through firm representatives like Chief Executive Officer (CEO) and representatives to enact financial policies that enhance company objectives, among them profit maximisation. In one of the meetings held to reflect on the impact of the policies, Cronos’ general accountant highlighted that in the past the decision making process had often been based on common sense and good faith of managers, without fully measuring the financial repercussions. He added that the new financial policies would steer and commensurate company managers, as they would provide guidance on the commercial decisions which must be intertwined with the firm’s profit maximisation.

These teleological modifications exerted reforms in commercial relations between Cronos’ customers and suppliers expecting to reduce (or increase) balances of working capital accounts and thus improve the cash conversion cycle. The plan had two strategic areas I) Commercial and financial measures and II) Supporting activities. The first contributed to the trading and financial improvement of the firm’s new strategic objective (aggressive strategy); whereas the latter acted as a back office support contributing to both product delivery and quality service.

I. Commercial and financial measures

1. Hitherto contracts were renewed every six months. The company decided to engage in long-term contracts of eighteen months with strategic customers, this facilitates forecasting of sales and accounts receivables; additionally it contributes to prospective acquisition of inventories.
2. The business concentrated on increasing sales efforts focusing on key customers. Cronos offered a progressive discount ranging from 0.75% to 3%. This measure induced customers into a promptly payment in 90 days in exchange for the discount. From the working capital perspective this implies efficiency in accounts receivables and acquisition of inventories.
3. The logistics manager acquired inventories only according to sales orders. This diminishes idle inventory, opportunity cost and therefore payables.
4. Cronos decided to renegotiate and if necessary to find new suppliers of metallic supplies who allow them to extend their accounts payables to 150 days in exchange for a long-term contract.

5. A deposit of 10% in advance from each order is requested; this has a twofold effect as it improves firm's liquidity and guarantees that the order will take place.

The preceding measures were strategically designed to create optimal metrics as described by the aggressive strategy, which consequently improves the cash conversion cycle and company profitability.

II. Supporting activities

6. To ensure products of outstanding quality the company has embarked on ISO 9001 certification, including an analysis of the product in supplier's facilities before shipping.
7. The firm expanded its logistics capabilities acquiring one building, two warehouses ten containers and four heavy-duty trucks. The latter facilitates and expands distribution of products free of charge; this guarantees fast delivery of products.
8. Technological changes in the web page have allowed follow up on placed orders. Furthermore, sales representatives now perform a customized service tracking down the product from supplier to customer.

6.9.5 EX-POST ACTION RESEARCH IMPLEMENTATION

After five consecutive quarters in March 2017, the implemented changes in Cronos reflected structural changes in company performance (section 9.8.2). This shows the financial statements ex-post figures after the action research recommendations were implemented. The aforementioned changes from section 6.9 had direct effects in the financial area. As 2016 unfolded, an aggressive stratagem was used where reduced current assets of \$8,569,572 mainly composed of smaller balances of accounts receivables \$5,923,895, inventories \$2,238,965 mainly financed by \$2,052,236 accounts payable became the core components of an improved working capital aggressive strategy as suggested by Nobanee and AlHajjar (2014); Shin and Soenen (1998). Moreover, assets were principally financed by current liabilities of \$5,416,203 and long term liabilities \$4,625,590. This exemplifies aggressive strategy company financing as described by Afrifa (2015). The applied changes had a positive effect in business performance; the firm reported \$22,763,851 in revenue, earnings before interest and taxes (EBIT) \$8,943,832 and net income \$6,614,569. This represented an increase of 16.59%, 39.63% and 114.85% respectively versus the previous year's figures. Additionally, profitability metrics improved as return on assets (ROA) 36.15% was almost four times the preceding figure in December 2015. Although, liquidity metrics, specifically, current and quick ratio diminished to 1.58 and 1.17, the business was still able to meet its financial obligations promptly (on a per dollar basis), without additional liabilities. This was

corroborated by an improved working capital management, where the cash conversion cycle of 101 days improved enormously compared against 925 days in the previous year. Furthermore, cash flow experienced a radical change, from \$ -23,887,835 to \$1,018,232. This came from the improvement of operating cash flow from \$5,676,910 to \$7,218,222. The latter occurred due to an improvement in EBIT of 39.63% and savings in interest expense of \$1,994,571. This came from a reframed capital structure where total liabilities have diminished to 54.87%; concordantly, times interest earned ratio enlarged; after 2016, the company could cover debt 19.29 times.

$$\begin{aligned}
 \text{Profitability}_{it} = & -0.05 - 0.002CCC + 0.05Size - 0.007PP - 0.08Debt + 0.08CATA - 0.0006AR \\
 & \quad \quad \quad 0.07 \quad \quad 0.002 \quad \quad \quad 0.003 \quad \quad \quad 0.01 \quad \quad \quad 0.007 \quad \quad \quad 0.002 \quad \quad \quad 0.000 \\
 & + 0.08FAturn + 0.07Timinter + u \\
 & \quad \quad \quad 0.005 \quad \quad \quad 0.007
 \end{aligned} \tag{23}$$

Equation 23 above depicts Cronos's relation between working capital management described by cash conversion cycle (CCC) and profitability. Concordant to extant aggressive strategy and financial econometrical literature (Afrifa, 2015; Garcia-Teruel and Martinez-Solano, 2007; Nobanee et al. 2011), the equation suggests that a reduced CCC improves Crono's profitability as reflected by the figures stated in the preceding paragraph. Furthermore, cash conversion cycle is affected by company size (LN of assets); this is positively affecting company performance. However, accounts payable, liabilities and current assets divided by total assets have a negative effect. Thus, Cronos should adequately diminish and manage both variable of interest (CCC) and the before mentioned controls to acquire an optimum performance level.

6.9.6 CRONOS CURRENT SITUATION

In January 2019, Crono's board of trustees met with company high executives to review firm performance of 2018. I contacted the general manager to review the current financial stance of the company. He mentioned that the firm still uses the aggressive strategy, implying that the inventories acquired are limited to the planned and prepaid operations. The latter has a twofold implication, as firstly, it determines that the company knows that merchandise was acquired for a specific customer, it will not be idle at the warehouse as in past. Secondly, accounts receivables are generated with certainty that the amounts owed will be collected. Also, it helps to plan properly the inflows in the cash flow of operations. Lastly, accounts payable as the by-product of new negotiations with current and some new suppliers, have been elongated. The preceding factors have contributed to maintain a healthy cash conversion cycle and return on assets.

6.10 ACTION RESEARCH SET MEMBERS

Set members are usually company employees who will solve an institutional problem whilst supporting organisational change. Set members bring individuals together in an atmosphere of mutual learning for the purpose of working on problems, where members are engaged, in exploring options to take action and solve an organisational conundrum (Vince, 2008). In the context of Cronos, due to the fact that the company was small, the set members remained the same during the cycles. I stimulated their cognitive and learning skills by asking insightful inquiries, and their contribution developed further inquiry and generated new perceptions. Applying the action research methodology helped Cronos employees develop intellectual, organisational learning and reflective skills. It produced heated debates due to the conflicting views of set members about what the action and the results ought to be. To reach this goal multiple action research meetings in groups of five were organised to actively discuss the financial working capital procedures.

In action research cycle one the primordial task was that of discussion and reflection because it was vital to understand the financial status quo. Moreover, it became essential to perform financial analysis. It also became key to provide the necessary scope and context of advanced financial concepts that enable set members to understand and assimilate the financial metrics to enhance working capital and profitability. This interactive cycle of discussion and feedback took place through interviews and discussion in action learning sets. The second action research cycle showed an improved view and comprehension of how to measure financial performance from a professional angle. Furthermore, in

cycle two action learning members mutually shared and discussed the content of how cash conversion cycle, debt, FAturn, Timinter, accounts payable period, CATA, size and accounts receivable period improves profitability within the context of aggressive strategy on current and past company financial statements.

6.10.1 SET MEMBERS INTERVIEWS

Action research requires the use of interviews to provide an understanding of a siderurgical broker, specifically how to enhance profitability as the result of an optimal working capital management. To understand the status quo all members intertwined in the financial-administrative process were summoned by the shareholders and upper management as per my request.

The interview had 15 questions, eight interviews were conducted, four interviews with upper management and four with the business analyst and accountants. Since the number of participants was small, I took notes from interviews; I used a deductive approach (Fereday and Muir-Cochrane, 2006). This technique examines and groups answers, gathering results to be converted in knowledge. My pre-understanding, experience and literature review enabled me to conduct better interviews and examinations using a deductive approach, whilst permitting topics to emerge from data employing inductive coding (Fereday and Muir-Cochrane, 2006).

The survey revealed experiences and the roles participants played in the company. These were quite relevant for the investigation. These questions provided an in-depth understanding of Cronos working capital management. Set members were considered homogenous, since all participants were professionals with a business administration background. Unequivocally, these researchers have a closer and deeper understanding with accountants and financial analysts. The survey and interview showed that accountants, analysts and managers possessed experience in their area of expertise (6 years on average) in different industries like aquaculture, agriculture, retail, manufacturing, international trade and commercial banking. However, this was the first time they had worked in the siderurgical industry, therefore they had to reframe their views and adapt to a new paradigm. Set members coincided that three prevailing factors affected both working capital management and profitability. 1) Iron and its by-products are the main raw material for a myriad of metallic finished goods. Local demand for this commodity fluctuates according to the demand of five large customers and multiple small customers with lower purchasing capabilities, this affects company sales directly. 2) The purchasing cost of metallurgy is another factor affecting gross profit, earnings before interest and taxes and net income.

This occurs due to the fact that steel is a commodity whose prices are quite volatile. Moreover, Indian and Chinese manufacturing plants have a tremendous influence in world prices; due to their massive production capabilities enabling them to generate economies of scale. 3) Financing for inventories and receivables becomes a pressing matter as the acquisition, collection and payment of merchandise within the scope of working capital crucially affects both liquidity and profitability (Wang, 2002). Access to financing options is a complex issue locally as political, economic, financial, market and operational factors affects company risk and performance, increasing borrowing costs. Additionally, firms are required to have outstanding credit history with commercial banking and commercial partners, besides onerous collaterals whose worth must be 140%. Although the credit history of Cronos was in good standing, unfortunately the company was short in terms of tangibility (collaterals), limiting credit options to finance assets.

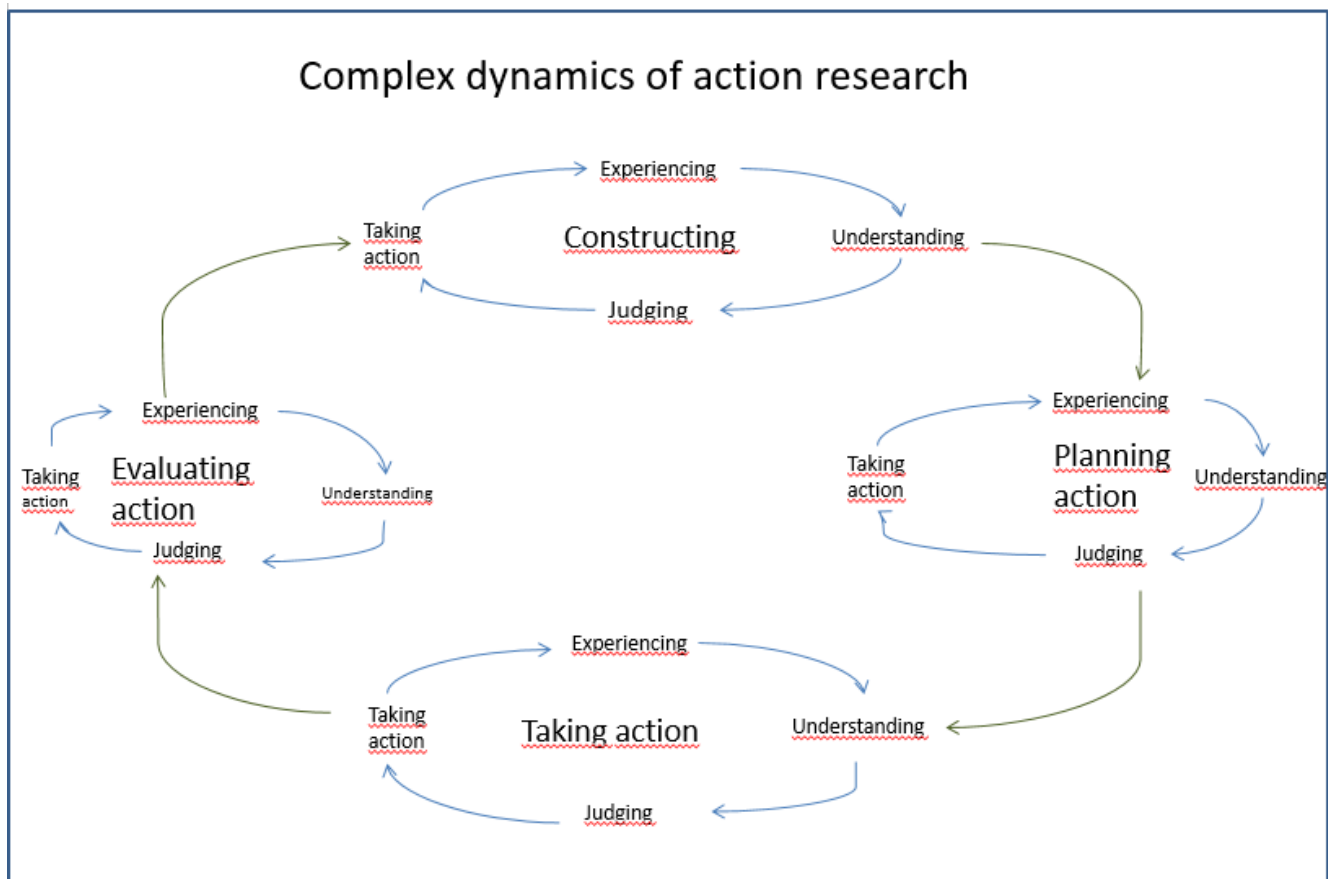


Figure 3 Complex dynamics of action research
Source: Coghlan (2007)

6.11 ACTION RESEARCH LEARNING OUTCOME

Action research members have learned that communal efforts render positive results, moreover this group effort towards company goals has produced significant improvements. The action research set composed of managers, analysts, accountants and myself have learned that Cronos financial strategy is circumscribed to efficiency of both planning and executing an aggressive strategy. This conclusion is based on empirical and quantitatively tangible results. When I began to assess Cronos I found a disorganised management of working capital accounts. The outcome of initial action research meetings helped the AR members and me to understand that the erratic and disproportioned growth and management of balance sheet and income statement balances was the underlying cause of a systematic problem. These figures were the by-product of poor decision making, based on the obtuse paradigm of a conservative strategy dictating that acquiring more will generate more profits. The company figures in appendix 9.8.1 reveal the features of that strategy the ex-ante situation. After arriving at this understanding, I explained a radical approach to working capital management. Then, after set members extensively discussed the advantages of the aggressive strategy, their collective acceptance enabled them to form an enthusiastic and collaborative group that implemented a dynamic commercial stratagem, rendering a more efficient operation with smaller balances of working capital accounts yielding a more profitable firm as evidenced in appendix 9.8.2.

6.12 CONCLUSION

The action research process has provided valuable lessons as company members no longer act as separate agents; now they work as symbiotic members of a living organism. They have learned that communal, collaborative and egalitarian participation provides valuable feedback enabling organisational learning. Moreover, the quantitative information presented has aided the company to obtain a new perspective hoping that prospective changes will steer the firm towards achieving the company goal of profitability enhancement. The company has learned from the dire consequences of an inappropriate conservative strategy, however through action research processes Cronos has highlighted and implemented a course of action for change and improvement. Specifically, set members have convened on smaller balances of inventories and receivables and moderate yet commensurate management of payables.

Due to a well-organised corporate restructuring process, company representatives were able to successfully enact a plan of action that followed an aggressive strategy. This quick and decisive management change in strategy whereby the set members (commerce and international business along

with financial representatives) allowed the dynamic process of trading iron and steel products to become an assertive practice; diminished amounts of merchandise were carefully planned and synchronized in the commercial and logistics areas to render an improved and enhanced financial management function. Consequently, the international business section along with the accounting department both reduced credit timespan and followed invoice payments timely to reduce receivables period. These steps unequivocally improved the cash conversion cycle and augmented profitability; moreover, company representatives (shareholders) reframed capital structure permitting a higher involvement of equity diminishing liabilities ergo lowering interest expense and improving times interest earned variable (Timinter).

This investigation is one of the few in Latin America on this topic, deeply scrutinizing metrics and proposing statistically significant new control variables for company enhancement. Thus, the thesis contributes to the book of knowledge by proposing financial econometric variables such as sales divided by fixed assets (FATurn) and earnings before interest (EBIT) divided by interest expense (Timinter) (Table 17). According to the current findings, it is suggested that diminishing the turnover of fixed assets (FATurn) and EBIT per interest (Timinter) enhances sales and therefore profits.

Thus, after careful deliberation of the premises discussed in the action research meetings; it became imperative for company representatives to set the firm on a new route. It was decided that the business needed to be steered towards a path involving reorganisation of working capital management with expectations on higher profits.

The following and final chapter concludes this investigation. The research aim and objective are revisited in the light of the findings from the study. The methodology employed is summarised, recommendations are made, grounded in the research findings. The contribution that this work makes to knowledge is defined, as well as the limitations. A more personal reflection of the process of conducting this research in the specific Ecuadorian context is included because this may be of value to those wishing to implement the findings or investigate further. Suggestions for further research are humbly offered.

CHAPTER SEVEN

CONCLUSIONS

7.1 INTRODUCTION

The following chapter shows the conclusions of the investigation. The segment provides a discussion on policy repercussions, objectives achieved, methodologies and investigation methods employed regarding working capital management and profitability. It summarises findings dealing with the appropriate financial variable to enhance short term management. Additionally, it explains the effects that other relevant financial metrics have on profitability when they are employed under specific circumstances (aggressive policy). In addition, it reveals the contribution this investigation provides to current financial literature and business knowledge and describes the limitations encountered in the research, whilst disclosing two feasible equations. It discusses how to solve plausible quantitative discrepancies. Finally, it mentions recommendations for future research and potential improvements.

7.2 RESEARCH AIM AND OBJECTIVES

The aim of the research was to determine to what degree working capital management explains profitability of companies monitored by the SIC. This research is the first of its kind explaining profitability through working capital management in the Ecuadorian context. This investigation opens doors for future research on the topic as it proposes independent variables to enhance profitability.

The next three objectives were determined to fulfil the aim of the investigation:

1. To ascertain whether or not working capital management and cash conversion cycle variables such as accounts receivable, inventories and accounts payable have an impact in profitability;
2. To broaden the limits of actual research and define new feasible variables elucidating profitability;
3. To help an actual firm implement financial-econometrical methods to enhance working capital management and improve profitability. The qualitative perspective of the thesis in chapter six aims at solving and learning through action the financial status quo of Cronos, a siderurgical broker with aggravating short term financial problems. These financial issues have been contrasted against industry results, evidencing a deteriorated situation on cash conversion cycle components. It had been observed that the company revenue performs well, while efficiency lagged behind. Therefore, the investigation sought to ameliorate the firm's net income.

7.3 RESEARCH METHODOLOGY

Quantitative and qualitative methods were employed. Company financial data from income statement and balance sheet from the real sector supplied by Superintendence of Companies over a seven-year period between 2000 and 2006 were analysed, since laws, protocols and specifically working capital administration traits and procedures vary significantly in businesses of the real sector. The research excluded financial service entities, commercial and investment banks, insurance companies, mutual funds firms, credit card companies among others. The investigation employed panel data regressing 46 companies per year. After much iteration, cash conversion cycle and profitability were selected as variable of interest and the endogenous variable respectively to explain working capital. The use of these variables was twofold. They were employed as part of a financial econometrical evaluation within a real company setting seeking to optimize working capital management and enhance profitability; in this study the company in question was Cronos, in the siderurgical sector. This evaluation, and the subsequent steps taken to use the information to improve company performance in this specific case, were analysed as an in-depth and extensive action research methodological inquisitive process that combined questionnaires, interviews and two action research discussions in cycles. Action research methodology was used to explore and understand the process of analysis and decision-making through a collective discussion based on empirical and academic actions.

7.4 STUDY FINDINGS

It was ascertained that working capital management does influence the profitability of firms controlled by the SIC. Moreover, in these companies it was determined that working capital management and cash conversion cycle components accounts receivable period, inventory period and accounts payable period do affect profitability.

Two new variables were proposed to explain profitability F_{Turn} and T_{inter} . These were also found to be statistically significant and therefore affect profitability by firms controlled by the SIC.

The relevance of the aforementioned findings were analysed within a real company setting seeking to optimize working capital management and enhance profitability. In the first action research cycle, set members defined the company status quo and conducted an in-depth financial analysis. In the second cycle, set members determined that Cronos used a conservative approach and that, from a financial perspective, it hindered the firm's goals. Moreover, the implementation of an aggressive stratagem was collectively accepted. The study also provided in a mathematical form (equation 23) a formula to correct working capital management and steer Cronos towards becoming a more profitable firm.

7.5 RECOMMENDATIONS

Traditional corporate finance literature and academics concentrate their efforts in long-term decisions involving capital structure, capital expenditure and investments (De Almeida and Eid, 2014). Working capital management has been perceived as an operative and routine errand enforced by middle managers. These undermined representatives are perceived to be concentrated on liquidity, often ignoring the significance of working capital and its components for businesses. According to Samiloglu and Dermigunes (2008), unsuitable management of current assets and liabilities decisions might lead to bankruptcy; therefore, firms should have equilibrium between profitability and liquidity. Decision making on the investment of accounts receivables and inventory should be balanced against the payments to suppliers (accounts payable), in order to maintain an optimal amount of working capital and an adequate cash conversion cycle.

Besides agreeing on cash conversion cycle as the variable of interest, equations 10 and 11 have the following variables in common: company size, accounts payables, level of indebtedness and the weight of current assets on total assets. These equations follow the aggressive policy as they recommend that working capital should be minimized (Deloof, 2003) to increase profitability. Moreover, the negative direction of debt and accounts payable imply that less indebted companies are more profitable. Equation 11 reports additional controls where fixed asset turnover, accounts receivable period and times interest earned stand out. Research results suggest that the smaller these accounts are, the more profitable firms become. Interestingly, extant literature indicates that accounts payable is a statistically significant variable. The direction of this metric ought to be positive, suggesting that an elongated balance on this account improves cash conversion cycle as period length is longer. However, my investigation reveals a negative direction.

The results section exhibits endogeneity on equation 11, implying that although cash conversion cycle explains return on assets, the opposite may also be true. Deloof (2003) previously observed the possibility of this phenomenon as it is possible that return on assets will have an effect on cash conversion cycle. To overcome this anomaly and obtain robust results, Baños-Caballero et al. (2013) recommend the implementation of instrumental variables (IV) and or generalized methods of moments (GMM) with an instrument.

7.6 CONTRIBUTION TO KNOWLEDGE

Locally there is almost no literature suggesting determinants for the improvement of profitability by optimizing working capital management, which was the focus of this investigation. This occurred due to lack of data in the past, since collecting data for institutions can become a burdensome process which consumes time and money; moreover, academic involvement was limited. Currently, thanks to an improved governmental policy of transparency of information, the necessary resources are available to conduct studies of this type.

This investigation attempted to explain the determinants of the profitability of companies in the Ecuadorian corporate sector, monitored and regulated by the Superintendence of Companies. The relevance of this research lies in the fact that it provides a guideline for companies in dollarized economies searching for optimisation of profit through the adequate management of short term financial resources.

The quantitative research provides new independent variables not previously found in the extant literature. The investigation proposes that two newly found balance sheet and income statement metrics (fixed asset turnover and times interest earned on equation 11 and equation 23) can help explain and improve company resource performance of working capital for siderurgical firms. Company performance metrics times interest earned ratio (Timinter) provides a solid foundation to assess company performance, due to the pivotal importance they have in firm evaluation. This long term solvency measure aids managers highlighting business capacity for debt repayment of financial obligations, thus the bigger this ratio the more debt firms may acquire. This investigation found a second metric fixed asset turnover (FATurn) which evaluates how efficient businesses are at managing fixed asset and depicts the amount of revenue per investment in fixed assets.

7.7 LIMITATIONS OF THE RESEARCH

The investigation contemplates data from 2000 until 2006, this limitation occurs due to data transparency. The selected period reveals reported data unbiased, from a period where Ecuador fostered diplomatic relations with all countries, reflecting both political and economic freedom. This enabled the country to have international trade with lower quotas and tariffs allowing free flow of foreign products. The relatively low country risk was an incentive for international investors to pour their resources locally, increasing foreign direct investment. The administration from 2007, was characterized by political turmoil local and international, instability, and civil unrest. Moreover, it has been reported in

the media that Government twisted and distorted economic, financial indicators to show a more favourable stance. Unfortunately, data from subsequent administrations is biased and should not be used. The research only considers formal businesses operating legally and monitored by competent governmental authorities. From the vast amount of businesses operating locally, only a reduced number of firms formally trade in the stock exchange.

From a financial econometrical perspective, the data processed should have ideally been within the parameters of balanced panel structure. However, the Superintendence of Companies supplied real information with algid variation on the number of companies (units). When new firms enter and some leave (i.e., because of bankruptcy) the formal sector of the economy, this creates a restriction, as researchers have to use unbalanced panel data for their econometric estimation. Also, Cronos belongs to a micro economic sector with limited number of participants, thus mathematical estimations are not as accurate as in perfect competition industries with significant number of units. Therefore, to assist better commercial decisions and steer profitability, it is recommended that companies follow closely working capital accounts within the recommended parameters of an aggressive strategy.

7.8 REFLECTION

This segment provides an introspective view of the challenges encountered in the development of the thesis. From the quantitative perspective, until recently it was not possible to uncover the structure and modus operandi of working capital in Ecuadorian companies, due to political and technological limitations. Recent actions under the new governmental administration have led to a greater transparency of information, allowing the disclosure of financial records. This permitted me to obtain access to an enormous volume of data to perform advanced quantitative analysis. Additionally, filtering data and processing information to convert it in a meaningful mathematical form. This data required extensive training in financial-econometrics, an art and science which is complex in essence and handled by few people in a developing country.

The qualitative segment of the research was as demanding as the aforementioned quantitative section. Training in action research was a complex issue which required Doctoral training to develop the necessary skills to engage in a participative and mutually agreed understanding and solving of a real life phenomenon. To further compound problems, the action research set had a limited financial academic knowledge. Their technical accounting training is focused on mechanical errands involving accumulating and processing data for recorded keeping and issuing financial statements. Therefore, it

took months to understand and handled advanced financial concepts, discussed in a mutually agreed matter. My recommendation for Cronos or any other company is to provide extensive training in finance. In order to improve company results, it is highly recommended that the company representatives must have a thorough understanding of how to handle and better yet comprehend the consequences of the accounts balances and its effects on ratios which are primordial for managerial decision making.

The vast majority of Ecuadorian businesses are family owned and tend to lack the relevant technical knowledge, instead relying on limited empirical knowledge. The meaningful application of financial knowledge in a large number of businesses would therefore require a wider acceptance of the value of assistance in the form of business, specifically financial, consultants. This trend is evident in neighboring countries such as Peru and Colombia but not, as of yet, in Ecuador.

7.9 FURTHER RESEARCH

The financial econometric research perspective considers a sample of siderurgical companies controlled by Superintendence of Companies. It is advisable for future research to use financial ratios of an expanded time span, using more companies to obtain more robust results.

Also, it is desirable to implement industry segmentation to differentiate the effect of cash conversion cycle on profitability. Although, the quantitative metrics are the same every industry characterizes a unique aspect of the economy; therefore, size, magnitude and direction of coefficients are subject to change. Moreover, the independent variables and controls explaining profitability might change according to the microeconomic structure of a sector.

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APPENDIX

9.1 APPENDIX 1: HETEROSCEDASTICITY TEST

Breusch – Pagan test for heteroscedasticity

Equation model	-10	-11
Chi2	503.97	443.2
Prob > chi2	0	0

White test for heteroscedasticity

Equation model	-10	-11
Chi2	254.41	370.08
P – value	1.50E-42	3.00E-44

9.2 APPENDIX 2: COLLINEARITY TEST

Variance Inflation Factor (VIF) test for collinearity

Equation (10)

Variable	VIF	1 / VIF
CCC	1.6	0.62
PayPer	1.57	0.63
CurrAssetsT A	1.12	0.89
TotalDebt	1.1	0.9
SizeLSales	1.01	0.99
Mean VIF	1.28	

Equation (11)

Variable	VIF	1 / VIF
CCC	5.67	0.17
NTC	4.05	0.24
Payper	2.62	0.38
WCSales	1.75	0.57
TotalDebt	1.25	0.79
CurrAssetsT A	1.25	0.79
FATurnov	1.04	0.95
EquitMultip	1.04	0.96
SizeLSales	1.01	0.99
TimInter	1	0.99
Mean VIF	2.07	

9.3 APPENDIX 3: NORMALITY TEST

Jarque – Bera and Shapiro - Wilkin tests for normality

Equation (10)

	Jarque - Bera	Shapiro - Wilkin
Variable	P - value	P - value
CCC		0
PayPer		0
CurrAssetsTA	0	0
TotalDebt	0	0
SizeLSales	0	0
Residuals	0	0

Equation (11)

	Jarque - Bera	Shapiro - Wilkin
Variable	P - value	P - value
CCC		0
NTC		0
Payper		0
WCSales	0	0
TotalDebt	0	0
CurrAssetsTA	0	0
FAturnov		0
EquitMultip		0
SizeLSales	0	0
TimInter		0
Residuals	0	0

9.4 APPENDIX 4: HAUSMAN TEST

Hausman test of endogenous variable: profitability

Equation model	-10	
Independent variables	CCC	
Models	Fixed Effects	Random Effects
Adjusted R ²	0.0791	0.0734
F ratio	0	0
Observations	322	322
Hausman chi2	73.87	
P – value	0	
Working capital variables		
CCC	-0.0001633	0.0001692
PayPer	-0.0001505	-0.0001627
CurrAssetsTA	0.0786116	0.0748176
TotalDebt	-0.0485991	-0.0628588
SizeLSales	0.01996	0.0123425

Robust and standard errors in brackets

*Significant at 10% **Significant at 5% ***Significant at 1%

Equation model	-11	
Independent variables	CCC	
Models	Fixed Effects	Random Effects
Adjusted R ²	0.0973	0.0863
F ratio	0	0
Observations	322	322
Hausman chi2	93.09	
P – value	0	
Working capital variables		
CCC	-0.0001072	-0.0001766
NTC	-0.0001554	-0.0000391
Payper	-0.0001098	-0.0001669
WCSales	0.067383	0.0487071
TotalDebt	-0.0481601	-0.0571993
CurrAssetsTA	0.0552963	0.0650241
FAturnov	0.0000105	-2.19E-06
EquitMultip	-0.0000778	-0.0001124
SizeLSales	0.0240296	0.0120253
Timinter	8.37E-08	7.28E-08

Robust and standard errors in brackets

*Significant at 10% **Significant at 5% ***Significant at 1%

APPENDIX 9.4B AKAIKE AND SCHWARZ CRITERION

Model	Observations	df	AIC	BIC
Fixed effects Group 1	322	316	10576.61	10546.56
Fixed effects Group 2	322	311	10113.45	10101.23

9.5 APPENDIX 5: ENDOGENEITY TEST

Durbin – Wu - Hausman test for endogeneity.

Equation model	-10
Durbin (score) chi2 (1)	2.1245
P - value	0.145

Equation model	-11
Durbin (score) chi2 (1)	1.3702
P - value	0.2418

9.6 APPENDIX 6: AUTOCORRELATION TEST

Wooldridge Tests for autocorrelation.

Equation model	-10
F(1, 1925)	20.49
Prob > F	0

Equation model	-11
F(1, 1925)	18.92
Prob > F	0

9.7 APPENDIX 7: MODEL SPECIFICATION TEST.

Ramsey test, Regression Specification Error Test (RESET) for model specification.

Equation model	-10
F(3, 19885)	14.55
Prob > F	0

Equation model	-11
F(3, 19880)	21.67
Prob > F	0

9.8 APPENDIX 9: FINANCIAL STATEMENTS

9.8.1 Cronos financial statements ex – ante

Table 21. Cronos Balance sheet ex - ante.
All figures are in U.S. dollars

Cronos BALANCE SHEET December 2015		
Cash	315,289	
Accounts receivables	16,989,965	35.87%
Inventories	28,895,632	61.00%
Prepaid expenses	209,456	0.44%
Investments (short term)	101,569	0.21%
Current assets	46,511,911	98.19%
Plant & warehouse	856,453	1.81%
TOTAL ASSETS	47,368,364	
Accounts payable	9,545,968	20.15%
Social security payable	89,632	0.19%
Taxes payable	270,962	0.57%
Short term debt	301,596	0.64%
Accumulated expenses	269,785	0.57%
Current liabilities	10,477,943	22.12%
Long term debt	34,901,523	73.68%
Equity	1,988,898	4.20%
TOTAL LIABILITIES & EQUIT	47,368,364	

Table 22. Cronos Income statement ex - ante.
All figures are in U.S. dollars

INCOME STATEMENT			
Cronos			
December 2015			
Revenue	19,523,981		
Cost of goods sold	11,635,891	59.60%	
Gross profit	7,888,090	40.40%	
Administrative Expenses	1,482,871	7.60%	
Salaries	911,562	4.67%	
Depreciation	140,038	0.72%	
Utilities	8,996	0.05%	
Insurance expense	120,895	0.62%	
Advertising expense	47,895	0.25%	
Marketing expense	43,892	0.22%	
Logistics expense	209,593	1.07%	
EBIT	6,405,219	32.81%	
Interest expense	2,458,186	12.59%	
EBT	3,947,033	20.22%	
Income tax	868,347	4.45%	
Net Income	3,078,685	15.77%	

Table 23. Cronos Free cash flow ex - ante.

All figures are in U.S. dollars

FREE CASH FLOW Cronos December 2015	
Operating Cash Flow	
Earnings before Interest and Taxes	6,405,219
+ Depreciation	140,038
- Income tax	(868,347)
+ Operating Cash Flow	5,676,910
Net Capital Spending	
Ending Net Fixed Assets	856,453
- Beginning Net Fixed Assets	(975,961)
+ Depreciation	140,038
Net Capital Spending	20,530
Change in Net Working Capital	
Ending NWC	36,033,968
- Beginning NWC	(6,489,753)
Change in NWC	29,544,215
+ Operating Cash Flow	5,676,910
- Net Capital Spending	(20,530)
- Change in Net Working Capital	(29,544,215)
Free cash flow	(23,887,835)

9.8.2 Cronos financial statements ex – post

Table 24. Cronos Balance sheet ex – post.
All figures are in U.S. dollars

Cronos BALANCE SHEET March 2017		
Cash	105,693	
Accounts receivables	5,923,895	32.37%
Inventories	2,238,965	12.24%
Prepaid expenses	195,896	1.07%
Investments (short term)	105,123	0.57%
Current assets	8,569,572	46.83%
Plant & warehouse	9,730,000	53.17%
TOTAL ASSETS	18,299,572	
Accounts payable	2,052,236	11.21%
Social security payable	85,632	0.47%
Taxes payable	275,896	1.51%
Short term debt	2,796,476	15.28%
Accumulated expenses	205,963	1.13%
Current liabilities	5,416,203	29.60%
Long term debt	4,625,590	25.28%
Equity	8,257,779	45.13%
TOTAL LIABILITIES & EQUITY	18,299,572	

Cronos
BALANCE SHEET
March 2017

Cash	105,693	
Accounts receivables	5,923,895	32.37%
Inventories	2,238,965	12.24%
Prepaid expenses	195,896	1.07%
Investments (short term)	105,123	0.57%
Current assets	8,569,572	46.83%
Plant & warehouse	9,730,000	53.17%
TOTAL ASSETS	18,299,572	
Accounts payable	2,052,236	11.21%
Social security payable	85,632	0.47%
Taxes payable	275,896	1.51%
Short term debt	2,796,476	15.28%
Accumulated expenses	205,963	1.13%
Current liabilities	5,416,203	29.60%
Long term debt	4,625,590	25.28%
Equity	8,257,779	45.13%
TOTAL LIABILITIES & EQUIT	18,299,572	

Table 25. Cronos Income statement ex – post.

All figures are in U.S. dollars

INCOME STATEMENT			
Cronos			
March 2017			
Revenue	22,763,851		
Cost of goods sold	11,162,369	49.04%	
Gross profit	11,601,482	50.96%	
Administrative Expenses	2,657,650	11.67%	
Salaries	1,412,598	6.21%	
Depreciation	140,038	0.62%	
Utilities	90,951	0.40%	
Insurance expense	321,968	1.41%	
Advertising expense	49,563	0.22%	
Marketing expense	109,963	0.48%	
Logistics expense	532,569	2.34%	
EBIT	8,943,832	39.29%	
Interest expense	463,615	2.04%	
EBT	8,480,217	37.25%	
Income tax	1,865,648	8.20%	
Net Income	6,614,569	29.06%	

INCOME STATEMENT

Cronos
March 2017

Revenue		22,763,851	
Cost of goods sold		11,162,369	49.04%
Gross profit		11,601,482	50.96%
Administrative Expenses		2,657,650	11.67%
Salaries	1,412,598		6.21%
Depreciation	140,038		0.62%
Utilities	90,951		0.40%
Insurance expense	321,968		1.41%
Advertising expense	49,563		0.22%
Marketing expense	109,963		0.48%
Logistics expense	532,569		2.34%
EBIT		8,943,832	39.29%
Interest expense		463,615	2.04%
EBT		8,480,217	37.25%
Income tax		1,865,648	8.20%
Net Income		6,614,569	29.06%

Table 26. Cronos Free cash flow ex – post.

All figures are in U.S. dollars

FREE CASH FLOW	
Cronos	
March 2017	
Operating Cash Flow	
Earnings before Interest and Taxes	8,943,832
+ Depreciation	140,038
- Income tax	(1,865,648)
+ Operating Cash Flow	7,218,222
Net Capital Spending	
Ending Net Fixed Assets	9,730,000
- Beginning Net Fixed Assets	(3,559,632)
+ Depreciation	140,038
Net Capital Spending	6,310,406
Change in Net Working Capital	
Ending NWC	3,153,369
- Beginning NWC	(3,263,785)
Change in NWC	(110,416)
+ Operating Cash Flow	7,218,222
- Net Capital Spending	(6,310,406)
- Change in Net Working Capital	110,416
Free cash flow	1,018,232

9.9 APPENDIX 10: ACTION RESEARCH QUESTIONNAIRE

9.9.1 CLUSTER A: EMPLOYEE PROFILE

1. What is your age?
2. What are your academic credentials?
High school ☐ Bachelor's degree ☐ Master's degree ☐
3. What is your position in the firm?
4. What is your professional experience in your current position?
5. How many years of experience do you have?

9.9.2 CLUSTER B: WORKING CAPITAL GENERAL INQUIRIES

1. Do you have to give priority to an element of working capital managed by you because of limited resources?
Yes ☐ No ☐
2. Kindly specify which of the following factors might be a limitation of working capital management
Information technology ☐ Lack of experience ☐
Lack academic knowledge ☐ Report delivery ☐

9.9.3 CLUSTER C: VARIABLE OF INTEREST AND CONTROL VARIABLES

Using the following likert scale, kindly mark in the boxes below with an "X"

SIZE

Total assets are relevant to increase profitability of the firm

- | | | |
|---|--|--|
| 1. strongly disagree <input type="checkbox"/> | 2. disagree <input type="checkbox"/> | 3. neither agree nor disagree <input type="checkbox"/> |
| 4. agree <input type="checkbox"/> | 5. strongly agree <input type="checkbox"/> | |

The firm designates a specific total assets threshold to be preserved

- | | | |
|---|--|--|
| 1. strongly disagree <input type="checkbox"/> | 2. disagree <input type="checkbox"/> | 3. neither agree nor disagree <input type="checkbox"/> |
| 4. agree <input type="checkbox"/> | 5. strongly agree <input type="checkbox"/> | |

The firm revises its total assets level regularly

- | | | |
|---|--|--|
| 1. strongly disagree <input type="checkbox"/> | 2. disagree <input type="checkbox"/> | 3. neither agree nor disagree <input type="checkbox"/> |
| 4. agree <input type="checkbox"/> | 5. strongly agree <input type="checkbox"/> | |

An increment in total assets increases profitability of the firm

- | | | |
|---|--|--|
| 1. strongly disagree <input type="checkbox"/> | 2. disagree <input type="checkbox"/> | 3. neither agree nor disagree <input type="checkbox"/> |
| 4. agree <input type="checkbox"/> | 5. strongly agree <input type="checkbox"/> | |

ACCOUNTS RECEIVABLE

Accounts receivable management is relevant to increase profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm designates a specific accounts receivable threshold to be preserved

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm revises its accounts receivable level regularly

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

An increment in accounts receivable increases profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

ACCOUNTS PAYABLE

Accounts receivable management is relevant to increase profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm designates a specific accounts receivable threshold to be preserved

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm revises its accounts receivable level regularly

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

An increment in accounts receivable increases profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

CASH CONVERSION CYCLE

Cash conversion cycle management is relevant to increase profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm designates a specific cash conversion cycle threshold to be preserved

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm revises its cash conversion cycle level regularly

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

An increment in cash conversion cycle increases profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

DEBT

Is Debt relevant to increase profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm designates a specific debt threshold to be preserved

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm revises its debt level regularly

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

An increment in debt increases profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

CURRENT ASSETS / TOTAL ASSETS (CATA)

Is CATA relevant to increase profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm designates a specific CATA threshold to be preserved

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm revises its CATA level regularly

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

An increment in CATA increases profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

SALES / FIXED ASSETS (FAturn)

Is FAturn relevant to increase profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm designates a specific FAturn threshold to be preserved

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm revises its FAturn level regularly

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

An increment in FAturn increases profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

EBIT DIVIDED BY INTEREST EXPENSE (Timinter)

Is Timinter relevant to increase profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm designates a specific Timinter threshold to be preserved

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

The firm revises its Timinter level regularly

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

An increment in Timinter increases profitability of the firm

1. strongly disagree ☐ 2. disagree ☐ 3. neither agree nor disagree ☐
4. agree ☐ 5. strongly agree ☐

9.9.4 CLUSTER D: ACTION RESEARCH SET QUESTIONNAIRE ANSWERS

9.9.4.1 ANSWERS CLUSTER “A” EMPLOYEE PROFILE.

	Inquiry / Set member answer	1	2	3	4	5	6	7	8	Average
1	What is your age?	25	40	37	37	31	29	27	22	31
2	What are your academic credentials?									
	Bachelor's degree	X	X	X	X	X	X	X	X	8
	Master's degree									
3	What is your position in the firm?	Analyst	Analyst	Analyst	Analyst	Manager	Manager	Manager	Director	
4	What is your professional experience in your current position?	3	2	3	2	1	1	2	2	2
5	How many years of experience do you have?	7	5	6	7	6	6	5	6	6

9.9.4.2 ANSWERS CLUSTER “B” WORKING CAPITAL GENERAL INQUIRIES

	Inquiry / Set member answer	1	2	3	4	5	6	7	8	Average
6	Do you have to give priority to an element of working capital managed by you because of limited resources?	No	No	No	No	No	No	No	No	
7	Kindly specify which of the following factors might be a limitation of working capital management									
	Information technology							X		1
	Lack of experience				X	X	X			3
	Lack academic knowledge	X	X	X	X					4
	Report delivery									0

9.9.4.3 ANSWERS CLUSTER "C". VARIABLE OF INTEREST AND CONTROL VARIABLES

		relevant to increase profitability	firm designates a specific threshold to be preserved	firm revises its _____ level regularly	increment in _____ increases profitability
1	CCC	2	1	1	2
2	Debt	2	1	1	2
3	SALES / FIXED ASSETS (FAturn)	2	1	1	2
4	EBIT DIVIDED BY INTEREST EXPENSE (Ti	2	1	1	2
5	Size (Total assets)	5	1	1	5
6	Accounts receivable	5	2	2	5
7	Accounts payable	2	2	2	2
8	CURRENT ASSETS / TOTAL ASSETS (CA	2	1	1	2