

A Comparison of the Current Ratio and the Cash Conversion Cycle in Evaluating  
Working Capital Cash Flows

By

Costa John

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Committee Chairperson

California Coast University

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Abstract of the Dissertation

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The purpose of this study was to compare the effectiveness of the current ratio and the cash conversion cycle in evaluating working capital cash flows from a diagnostic and a predictive aspect.

The author analyzed two case studies. Each company was reviewed over a five-year period. For each company the writer calculated the annual current ratio and the cash conversion cycle and examined the trends over the five-year periods under review.

Results of these analyses indicated that the cash conversion cycle was more effective than the current ratio in diagnosing the health of each company's working capital cash flows. The cash conversion cycle also signaled a change in liquidity earlier than the current ratio, suggesting that the former had more effective predictive capabilities than the latter.

The central implication of these findings is that the cash conversion cycle might be a more useful diagnostic and predictive tool than the current ratio in liquidity analysis.

The research findings were also consistent with improvement or deterioration in each company's underlying strategic performance as measured by critical changes in its competitive position at the same point in time as the cash conversion cycle trend shifted.

These results suggest that the cash conversion cycle may provide insights into the impact of planned product-market strategy on shareholder value.

## Table of Contents

LIST OF TABLES .....	iv
ACKNOWLEDGMENTS.....	v
CHAPTER	
1. Introduction.....	1
Statement of the Problem .....	1
Statement of the Purpose .....	8
Definition of Terms.....	9
Limitations of the Study .....	11
2. Review of the Literature.....	13
Background .....	13
The Current Ratio.....	19
The Cash Conversion Cycle .....	23
Dell Computer Corporation .....	29
Conclusion .....	34
3. Methodology .....	35
Overview .....	35
Subjects .....	35
Instruments.....	36

Procedures .....	36
Associated Automotive Distributors Case Study .....	36
<u>International Microcomputer Software</u>	
Case Study.....	41
4. Results .....	47
Associated Automotive Distributors (AAD) .....	47
Strategic Profile.....	47
Factors Affecting Liquidity .....	48
Liquidity Analysis.....	50
International Microcomputer Software, Inc. (IMSI).....	60
Strategic Profile.....	60
Factors Affecting Liquidity .....	64
Liquidity Analysis.....	66
5. Summary, Conclusions and Recommendations.....	79
Summary.....	79
Conclusions .....	79
Recommendations .....	81
BIBLIOGRAPHY .....	85
APPENDICES .....	89
Appendix A: AAD Research Consent Form	
Appendix B: IMSI SEC Annual Financial Statement Filings	

## LIST OF TABLES

Table	Page
1. Informal Survey of Banks' Use of Liquidity Analysis Ratios .....	17
2. Informal Survey of Web Sites' Use of Liquidity Analysis Ratios .....	18
3. Dell Computer Corporation, Inc. Financial Statement and Liquidity Ratio Summaries 1997-2001 .....	33
4. Associated Automotive Distributors (Pty) Ltd. Income Statement Summaries 1992-1996 .....	39
5. Associated Automotive Distributors (Pty) Ltd. Balance Sheet Summaries 1992-1996 .....	40
6. International Microcomputer Software, Inc. Income Statement Summaries 1994-1998 .....	43
7. International Microcomputer Software, Inc. Balance Sheet Summaries 1994-1998 .....	44
8. Associated Automotive Distributors (Pty) Ltd. Liquidity Ratio Summaries 1992-1996 .....	49
9. International Microcomputer Software, Inc. Liquidity Ratio Summaries 1994-1998 .....	67
10. IMSI – Reported vs. Pro forma CCC (Cash Conversion Cycle) 1994-1998.....	77

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## CHAPTER ONE

### Introduction

#### Statement of the Problem

Financial managers are constantly faced with a familiar yet vexing challenge – how to plan and control corporate working capital cash flows.

To achieve liquidity objectives within the constraints of maximizing shareholder value, companies seek to monitor and review trends that affect cash flows. Judicious liquidity management must be proactive in order to allow the company as much time as possible for corrective action. Failure to do so may leave apparently robust companies vulnerable to bankruptcy, in a variety of macroeconomic environments (Richards and Laughlin, 1980).

Liquidity management is important during periods of rapid expansion because of the typical need to fund the higher levels of working capital associated with increasing sales. This function is also significant during periods of contraction and consolidation because of the corresponding requirement to avoid the buildup of non-liquid inventories and near-liquid receivables that can occur as sales or the rate of sales growth slow down.

Lenders and equity analysts have traditionally used the current ratio to gauge the short-term liquidity and solvency of corporations. Users of financial

statements typically interpret deterioration of the current ratio as an indicator of declining liquidity. Similarly, users interpret an increase in the current ratio as an improvement in corporate liquidity. A pattern of decline in the current ratio may be interpreted as a trend that, uncorrected, is predictive of ultimate financial distress.

For monitoring purposes lenders have utilized rule-of-thumb loan covenant thresholds, such as a current ratio no less than 2-to-1 as an early warning system, or more sophisticated proprietary techniques such as the Z score for predictive purposes.

In practice, however, lenders and analysts have tended to utilize the current ratio more broadly as one of many ratios applied to financial statements in order to diagnose developing trends – although the cash conversion cycle has apparently not been widely adopted in multi-ratio financial analyses.

As technological advances have accelerated the rate of change in markets, companies have had to adapt to their rapidly changing environments with more responsive quantitative financial analysis.

One factor critical to a company's success is its ability to effectively assess the health of its working capital cash flow generation.

The Encarta Online Dictionary defines the core term "effective" as follows:

1. producing a result: causing a result, especially the desired or intended result, and
2. having a striking result: successful, ..

Extending this definition to the evaluation of working capital cash flows, the writer examined the widely-used current ratio and compared it with the

lesser known cash conversion cycle, in order to assess how each analytical tool meets the criteria associated with successfully “producing the intended result.”

The criteria used to measure the effectiveness of financial ratios derive from the intended use of financial ratios.

Brigham and Gapenski (1991) described the purpose of financial statement analysis as follows:

From an investor’s standpoint, predicting the future is what financial statement analysis is all about, while from management’s standpoint, financial statement analysis is useful both as a way to anticipate future conditions and, more important, as a starting point for planning actions that will influence the future course of events.

They went on to assert that liquidity analysis was a primary aspect of financial analysis because it seeks to address the key question of whether a company has the ability to meet maturing obligations.

Single-point accuracy alone would prevent a company’s ability to establish patterns and trends, hence the additional criterion of consistency. Accurate and consistent ratios, while necessary, would be insufficient because the intended purpose described by Brigham and Gapenski (1991) of anticipation to plan for future results would still not be possible.

Without the latter need for predictive analysis and decision support, users of financial statements could simply turn to the statement of cash flows for accuracy and consistency. The effectiveness criteria which include forecasting and decision support, underscore the functionality of a statement of cash flows

as a necessary but insufficient reconciliation of cash sources and uses. It falls short of providing important information about the underlying causes for the size and timing of cash receipts and disbursements, and by implication this limits its usefulness in predictive liquidity analysis.

Logically, therefore, the three criteria for effectiveness are accuracy, consistency, and predictive ability.

Earlier financial literature (Beaver Kettler and Stoles (1970)) dealt with static measures of liquidity. Static liquidity ratios are derived from balance sheet accounts, which only represent assets and liabilities at the balance sheet date.

One common and widely used liquidity ratio is the current ratio, defined as current assets divided by current liabilities. Except in circumstances where company operations cease and assets are converted to cash as part of a liquidation, balance sheet assets are not fully representative of its cash generation capabilities. As a result, the accuracy of this ratio as a measure of liquidity should be viewed with caution.

As more fully detailed in the literature review section, the consistency of the current ratio, and by implication its predictive ability (Wertheim and Robinson, 1991), is also brought into question because of the different timing and risks associated with the ultimate conversion of each illiquid current asset into cash. The current ratio simply aggregates all current assets in the numerator of the ratio.

Dynamic ratios, particularly working capital activity ratios such as days' sales outstanding and inventory turnover have been widely discussed in financial management literature (Brigham and Gapenski, 1991). Unlike static metrics, activity ratios offer more accurate perspectives of the individual flow of each current asset as it progresses towards liquidity in the form of cash collections and deposits.

Richards and Laughlin (1980) argued that the dynamic nature of corporate liquidity could be incorporated into balance sheet items by relating them to income statement measures of operating activity.

Although individual activity ratios have been comprehensively analyzed in financial literature, only the cash conversion cycle combines receivables, inventory and payables activity ratios to present an integrated view of corporate liquidity that derives from the interrelated purchasing, production, distribution, sales and collection functions of the firm.

The cash conversion cycle received some discussion and attention in financial management literature (Gitman (1974)). Despite the findings of Richards and Laughlin that the cash conversion cycle offers an accurate indicator of corporate liquidity and that the current ratio can produce conflicting and incorrect results, the current ratio has retained the overall level of acceptance as "the liquidity ratio of choice." Informal surveys of major banks and a review of leading financial web sites, more fully described in the literature review section, confirmed the popularity of the current ratio and the relative obscurity of the

cash conversion cycle, although individual elements such as days' sales outstanding and inventory turnover are sometimes analyzed.

The cash conversion cycle comprises three activity ratios: days' sales outstanding plus days' inventory in cost of sales minus days' payables outstanding (Richards and Laughlin, 1980). This composite ratio attempts to measure the effects of customer credit and collection activities, inventory production, holding and distribution activities, as well as vendor credit and disbursement activities, on corporate working capital cash flows.

This research therefore explored questions related to the fundamental effectiveness hypothesis. Do the ratios produce similar results? What reasons could be attributed to analyses that produce different results? Do users of financial ratios tend to prefer static or dynamic liquidity ratios?

To the extent that different current assets convert to cash over different periods of time, does the cash conversion cycle offer significantly different results that provide a more effective indicator of corporate liquidity? Does the cash conversion cycle as an integrated ratio portray more effective liquidity information than individual activity ratios?

Is there additional empirical evidence to support the view that traditional current ratio analysis has the inherent potential to misinterpret a company's liquidity position?

Can the cash conversion cycle be applied to other types of corporate analysis? Can the cash conversion cycle be modified to improve its effectiveness?

In summary, is there a significant difference between the effectiveness of the current ratio and the cash conversion cycle in evaluating working capital cash flows?

## Statement of the Purpose

The researcher's study was designed to examine and compare the current ratio and the cash conversion cycle and their effectiveness in evaluating working capital cash flows.

The writer approached this problem through literature surveys, critical analysis, an informal review of lender practices, and two case studies.

This study was designed to test the hypothesis that despite the popularity and ease of use associated with the current ratio, the cash conversion cycle is a superior diagnostic tool as well as a more timely predictive tool for decision support.

The significance of testing the effectiveness hypothesis relates directly to the benefits of timely and accurate liquidity analysis.

Successful liquidity management can contribute to more responsive monitoring and action designed to maximize a company's generation of cash flows and to detect and correct trends indicative of cash consumption that may ultimately contribute to a company's financial distress and even failure. Improved liquidity management could therefore assist in preserving and enhancing shareholder value.

Demonstration of the effectiveness of the cash conversion cycle adds to the existing body of knowledge that supports its use as a superior tool for liquidity analysis. Such effectiveness could lend further support to empirical

research that suggests the current ratio may even be inaccurate in certain circumstances.

The research was equally important in exploring the potential for additional uses of the cash conversion cycle and possible improvements to the existing ratio.

By examining the merits of these ratios and their application in two case studies, the writer believes that this research will provide an impetus for further inquiry into the cash conversion cycle and its broader application in corporate financial management.

#### Definition of Terms

The Financial Management Function: the management of corporate investment, financing, and budget decisions designed to maximize shareholder value.

Corporate Working Capital Cash Flows: cash flows generated from the management of a company's current assets and current liabilities.

Operating Cash Flows: net income or loss for a financial reporting period plus non-cash expenses plus corporate working capital cash flows.

Statement of Cash Flows: a supplemental financial report to the corporate balance sheet and income statement for a financial period that calculates the sources and uses of cash flows for the same reporting period.

Current Assets and Current Liabilities: company resources and obligations that are converted and/or extinguished within 12 months of the reported balance sheet date. The primary components of current assets are cash, receivables, and inventories. The primary components of current liabilities are accounts payable, accrued liabilities, and short-term borrowings.

The Current Ratio: a ratio comprising the sum of a company's current assets as the numerator and the sum of its current liabilities as the denominator.

The Quick Ratio: a ratio calculated by dividing a company's current liabilities into its current assets minus its inventory.

Days' Sales Outstanding: a ratio computed by dividing receivables at the end of a financial reporting period into annualized sales for the same period, and multiplying this ratio by 365.

Days' Inventory in Cost of Sales: a ratio calculated by dividing inventory at the end of a reporting period into annualized cost of sales for the same period, and multiplying this ratio by 365.

Days' Payables Outstanding: a ratio computed by dividing payables at the end of a reporting period into the sum of the annualized cost of sales and operating costs or the same period, and multiplying this ratio by 365.

The Cash Conversion Cycle: a ratio that is represented as follows:

$$365 \times \left[ \frac{\text{Receivables} + \text{Inventory}}{\text{Sales}} - \frac{\text{Cost of Sales}}{\text{Cost of Sales} + \text{Operating Expenses}} \right]$$

Return on Assets: a ratio comprising the annualized corporate after-tax operating profits for a financial reporting period, as the numerator, and the total corporate assets at the beginning of the period as the denominator.

Times Interest Earned: operating profit for a financial reporting period divided by interest charges for the same period.

Cash Flow Return on Investment: a ratio of annualized corporate net cash flows for a financial reporting period divided by the total corporate assets at the beginning of the period.

Capital Asset Pricing Model (CAPM): an asset valuation model that defines the required rate of return on an asset as the risk-free rate plus a premium for asset-specific risk that cannot be eliminated by diversification.

### Limitations of the Study

This study explored both critical comparative analysis and two historical case studies. The evaluation of the current ratio and the cash conversion cycle was therefore reviewed in terms of both theoretical constructs as well as applications in practice.

However, the findings from a low-constraint environment of two companies in different markets, different geographic locations, and during different time frames, are statistically insufficient for extending the observed

comparisons of the current ratio and the cash conversion cycle to the broader corporate environment.

The author cited anecdotal evidence of continuing widespread support for the current ratio and an apparent lack of broad acceptance of the cash conversion cycle. Statistically representative empirical research of liquidity analysis and management would be necessary in order to corroborate the author's findings.

The writer presented data in support of the large number of annual corporate bankruptcy filings in the USA. Although this provided a context to the scale of corporate financial distress, further research would be needed to establish a lack of financial liquidity ratios as a key cause of these failures.

This research was designed to offer a renewed and expanded perspective on the usefulness of the cash conversion cycle as a diagnostic and predictive liquidity tool. A successful test of the hypothesis would therefore provide additional evidence of the effectiveness and limitations of the current ratio and the cash conversion cycle, even if generalization of the results from this research to corporations in general requires additional empirical testing.

## CHAPTER TWO

### Review of the Literature

#### Background

The management of corporate working capital cash flows is important to the financial management function. Maximizing cash flows is a practice consistent with the shareholder value objective. This enables a company to minimize the need for external debt or equity capital, thereby avoiding the incremental financial risk from additional borrowings and the incremental dilution risk from further issues of equity securities.

Van Horne (1983) argued this importance from a shareholder value perspective, ironically after first positing a perfect capital market scenario in which liquidity had no impact on shareholder value. Relaxing these assumptions to account for real-world imperfections such as bankruptcy risks and costs, Van Horne articulated the following argument:

In effect, bankruptcy costs represent a drain in the system to suppliers of capital. This drain obviously works to the disadvantage of equityholders who have a residual claim on assets in liquidation. Higher interest rates are another result as creditors seek ways of passing on all or part of the ex ante costs of bankruptcy. This obviously also works to the disadvantage of equityholders.

Van Horne continued:

As liquidity is increased, the probability of technical insolvency can be reduced. The benefits associated with this reduction will depend on the magnitude of the bankruptcy costs avoided.

In 1991, Brigham and Gapenski estimated that short-term financial planning consumes about 60% of financial managers' time. Citing maintenance of corporate working capital cash flows as the primary purpose of short-term financial decision-making, the authors stated:

A firm that is liquid can by definition support its operational goals, since it has the funds that are needed to make payments to its workers, suppliers, tax collectors, investors and so on. Conversely, a firm that is illiquid cannot easily generate the cash needed to make these payments and thus its operations suffer. In some situations, illiquidity may only be temporary, but in other cases it may be the first symptom of severe problems that could ultimately lead to bankruptcy.

The continuing rates of corporate bankruptcies, loan defaults, special and non-performing loan assets, debt standstill agreements, and companies in turnaround or workout mode, suggest that the problem of accurate diagnostic and predictive cash flow tools has not been adequately addressed by the traditional methods presently in use.

BankruptcyData.com (2001), a web site providing news and resources relating to bankruptcy in the USA, cited the Administrative Office of the US Courts in presenting statistics for bankruptcy filings. According to the table, in 1980 business bankruptcy filings totaled 43,694. By 2000 comparable business filings were 35,472.

Brigham & Gapenski (1991) cited the failure of Braniff Airlines in the high-interest rate environment of the 1980s as an example of the importance of short-term financial planning. Another more recent case is Pacific Gas & Electric Co. which filed for Chapter 11 bankruptcy protection in 2001, citing the adverse impact of selective deregulation as the underlying cause of unsustainable high energy costs which forced the utility into a debt standstill.

In what was likely viewed by Californians as unthinkable, a hitherto profitable and creditworthy utility fell into rapid financial distress. Viewed from the perspective of the author's research, Pacific Gas & Electric Co. encountered a regulatory-driven unsustainable cash conversion cycle.

In its September 2001 filing, the utility offered its view of how this could have occurred within just months:

Prior to the summer of 2000, the Debtor was one of the healthiest energy utilities in the United States, enjoying investment grade credit ratings and consistently paying dividends to its shareholders. As a regulated public utility, the Debtor operated under the historical (and constitutionally required) "regulatory compact." Under that compact, the Debtor undertook to serve all the electric and gas customers in its service territory in exchange for rates that allowed it to cover its costs of providing service, recover its investment in facilities serving the public and the opportunity to earn a reasonable rate of return.

Beginning in June 2000, prices for power purchased on the wholesale market began to increase. Prices moderated somewhat in the fall before spiking to unprecedented levels in November and subsequent months. The Debtor filed this Chapter 11 Case after the California Public Utilities Commission (the "CPUC") ignored the Debtor's repeated requests to allow it to recover in its retail rates the costs the Debtor was incurring to buy electricity for its customers. The Debtor first requested relief from the CPUC in August 2000, continued its requests through the fall, and made a

specific proposal for emergency rate relief in November 2000 to provide rate stability to its customers while the Debtor continued to use its good credit to buy power on their behalf. However, the CPUC and the State of California reacted to the Debtor's requests either by taking steps that were directly counter to the Debtor's financial preservation or by failing to act in a timely manner on the Debtor's requests. By April 6, 2001 (the "Petition Date"), the Debtor had incurred approximately \$8.9 billion in procurement costs, including \$2.3 billion attributable to the Debtor's generation, that the CPUC refused to allow the Debtor to collect from its Customers and had billions of dollars in defaulted debt and unpaid bills. All of the major credit rating agencies had downgraded the Debtor to uncreditworthy ratings, which precluded the Debtor from purchasing power in the wholesale markets under federally approved tariffs. As a result, the Debtor turned to the Bankruptcy Court for relief.

Pacific Gas and Electric Co. is admittedly an extreme case of the need for more effective liquidity tools but it dramatically illustrates how no corporation is immune when its cash-to-cash generation capabilities are adversely affected. At the time of the writer's research, it was still unclear whether the utility filed for protection because it had run out of profits, a revenue-expense challenge, or because it had run out of cash – either a revenue-expense challenge or a severe distortion of its cash conversion cycle.

The author's review of the events leading up to the filing indicated that the power rate spike was temporary and that the plan of reorganization called for full payment of outstanding obligations, suggestive of circumstances that could be plausibly explained as the need for some liquidity "breathing room." If so, the factors that affected the cash conversion cycle such as downgraded credit ratings and denied vendor credit may have been as causative as the temporary profitability problem.

The author conducted two informal, non-statistical samples of banks (see Table 1) and financial web sites (see Table 2) to determine the extent of their usage of the current and quick ratios as well as the cash conversion cycle.

TABLE 1

Informal Survey of Banks' Use of Liquidity Analysis Ratios

Bank	Current Ratio		Cash Conversion Cycle	
	Aware of the Ratio?	Use the Ratio?	Aware of the Ratio?	Use the Ratio?
CIT	Yes	Yes	No	No
Comerica	Yes	Yes	No	No
Greater Bay	Yes	Yes	No	No
Heller Financial	Yes	Yes	No	No
Sanwa	Yes	Yes	No	No
Silicon Valley	Yes	Yes	No	No
Sumitomo	Yes	Yes	No	No
Union	Yes	Yes	No	No
Wells Fargo	Yes	Yes	No	No
West America	Yes	Yes	No	No

Note. Based on author's informal interviews with lending officers of respondent banks between 1991 and 2001.

TABLE 2

Informal Survey of Web Sites' Use of Liquidity Analysis Ratios

Web Site	Use of Current Ratio?	Use of Cash Conversion Cycle?
Ameritrade.com	Yes	No
BusinessWeek.com	Yes	No
Clearstation.com	Yes	No
CNNFN.com	Yes	No
Etrade.com	Yes	No
FT.com	No	No
Hoovers.com	Yes	No
Lycos.com	Yes	No
Multex.com	Yes	No
Nasdaq.com	Yes	No
Quicken.com	Yes	No
Schwab.com	Yes	No
SmartMoney.com	No	No
TDWaterhouse.com	Yes	No
TheStreet.com	Yes	No
WallStreetCity.com	Yes	No
Wrhambrecht.com	Yes	No
WSJ.com	Yes	No
Yahoo.com	Yes	No
Zacks.com	Yes	No

Note. Based on review of web sites last reviewed on 7 December, 2001 using ticker symbol AAPL (Apple Computer Corporation, Inc.)

All the banks interviewed and all the web sites reviewed make extensive use of the current and quick ratios and no use at all of the cash conversion cycle.

It is possible that the informal surveys produced the indicated results for reasons other than the author's speculation.

The banks were neither selected nor interviewed in a controlled environment. A more formal survey may have included different banks and may

have yielded different results. The liquidity analysis techniques of the banks were reviewed over 11 years and may have changed since then.

It is plausible that the web sites surveyed may not be statistically representative of the general population of financially oriented web sites. Formal research may have led the author to different web sites and even to different locations on the same sites reviewed in this survey, resulting in different findings about the types of ratios used for liquidity analysis.

The significance of these informal surveys is therefore limited to anecdotal findings, but the universal consistency of the results is nevertheless a noteworthy starting point that does not contradict the author's assertion that the current ratio and the quick ratio still appear to be more widely used than the cash conversion cycle.

### The Current Ratio

The current ratio and its derivative, the quick or "acid" ratio, are balance sheet ratios designed to measure the proportion of a corporation's current assets, relative to its current liabilities.

The underlying premise behind its use is compelling in its simplicity. The firm's most pressing needs for cash are logically found in its maturing obligations, namely its current liabilities. Although not always the case, the most

likely sources of repayment of these obligations are liquid and imminently liquid assets.

Following this premise, an investor and lender examining the company's ability to meet its maturing obligations would require a ratio of at least 1:1, in essence seeking assurance that there is working capital – at least a dollar of current assets for every dollar of near term obligation.

Recognizing that not all current assets are "born equal" and may not necessarily convert to cash at the same rate, financial analysts address this in two ways. First, they use another more stringent ratio, the quick ratio, which uses the basic current ratio but eliminates (less liquid) inventories from the equation. Second, they assign a higher requirement for the current ratio (typically greater than 2:1) than for the quick ratio (typically greater than 1:1).

Among the most appealing aspects of this ratio and its derivative are ease of use and intuitive appeal, aside from the reported correlation with market risk, as described later in this chapter.

This technique, however, has severe limitations as both a diagnostic and predictive tool. The limitations extend beyond the well-documented issues applicable to financial ratios in general. The current ratio is, by definition, a static ratio. It utilizes balance sheet items only and incorporates no activity or cash flow variables. The balance sheet is conceptually similar to a still photograph and the income statement is equally analogous to a film. Extending

this analogy, balance sheet ratios represent “snapshots” of a point in time and are unable to reflect the underlying trends of a company’s liquidity over time.

The writer has examined this ratio in depth, concluding that there are several other limitations, including quantitative distortions, accounting policy effects, and ultimately, conflicting results that can trigger ratio calculations that are counterintuitive to the underlying health of the firm’s liquidity.

Since the conflicting results have been addressed more fully in the selected case studies, quantitative distortions and accounting policy effects warrant further discussion.

Consider a company that reports current assets of \$1,000,000 and current liabilities of \$500,000 at balance sheet date. The current ratio under this assumed state may be calculated as \$1,000,000 divided by \$500,000, or 2:1.

If the company added \$100,000 to both current assets and current liabilities on the day following that report, to reflect the receipt of \$100,000 of components into inventory from a supplier that offers credit terms of 45 days, the user of these financial statements should be able to assume that the liquidity balance of this company has not been altered by the addition of equal dollar amounts to both assets and liabilities, but the new current ratio is \$1,100,000 divided by \$600,000 or 1.83:1.00. This is one example of many possible quantitative distortions that can occur in the ratio, independent of any change in the fundamental liquidity of a company.

Similarly, consider the many feasible accounting policy options facing companies in the same industry grouping. Depending on each company's selected policy options, the reported current ratios can lose comparability.

As a simple example, assume that a company has the possibility to account for inventory on a first-in-first-out, last-in-first-out, actual, standard, or weighted average cost basis. That choice alone, affords the company five different possible values for the same physical inventory to which it has title. Extending this example to other current assets and liabilities, companies can conceivably present working capital accounts with multiple values, depending on the chosen policies.

Some financial management theorists nevertheless continue to express support for the current ratio as the key indicator – and predictor – of a company's working capital cash flow capacity.

Reviewing the relationship between accounting and market data as risk measures, Beaver Kettler and Stoles in 1970 asserted that the current ratio and beta, a market measure of corporate risk, were highly correlated.

In 1972, Logue and Merville in a similar study, asserted:

As our liquidity variable, the current ratio, (CR) – current assets divided by current liabilities – was chosen. Even a cursory review of most investment text suggests this variable's importance: it is widely understood by investors; has more intuitive appeal than other measures ...

## The Cash Conversion Cycle

The cash conversion cycle is a measure that attempts to represent the number of days during which a company's cash resources are committed to working capital before being converted once more to cash resources.

The three primary elements are the receivables collection cycle, the inventory conversion cycle, and the payables deferral cycle. As their titles suggest, extending the number of days in the receivables and inventory cycles will increase the period of working capital illiquidity, while extending the payables cycle will decrease the period of working capital illiquidity of the firm.

The strengths of this method in terms of its ability to diagnose and predict the health of working capital cash flow generation lie in the use of activity-based income statement items and the opportunity to separately evaluate a company's credit and collection policies, its purchasing, production and distribution practices, and its trade credit payment practices.

An additional advantage is its ability to identify liquidity-threatening buildup of inventories and receivables disproportionate to sales growth – an aspect that could otherwise be interpreted by the current ratio as an improvement in cash flow capability.

There are limitations to this metric beginning with the availability of data for external, non-management users. Unlike the current ratio, which extracts information directly from the balance sheet, the cash conversion cycle requires

information from the income statement as well. Often the cost of sales information may not be available to the investor and/or lender. As another example, the payables calculation relies on details about categories of current liabilities that are sometimes only available to the company.

Additionally, the cash conversion cycle may be unable to eliminate seasonal distortions without more detailed monthly reporting. Sufficient data regarding seasonality would allow adjustments to be made to the calculation.

The writer examined other mechanical and economic aspects that limit the accuracy and usefulness of the cash conversion cycle.

Similar to the current ratio, the cash conversion cycle utilizes balance sheet and income statement accounts that are subject to alternative methods of calculation and presentation, giving rise to distortions in comparability that are unrelated to fundamental changes in a company's liquidity.

Companies can select fiscal year end reporting dates which reflect balance sheet values and current asset compositions that are influenced by seasonality, such as retail companies dependent on the December holiday season. Such companies may accordingly report changing cash conversion cycles at different times of the year that reflect a mix of seasonal changes in the business and underlying liquidity management decisions. It appears that the cash conversion cycle's accuracy can be improved by adjusting each of the three components for seasonal volume increases and decreases.

Lewellen and Johnson (1972) and Stone (1976) asserted that the days' sales outstanding (DSO) ratio was not a reliable measure of collection efficiency in companies with seasonal sales patterns. The aggregation of receivable balances over average sales could give rise to a changing DSO, even if the payment patterns of the underlying customers remained constant.

To overcome this distortion, they suggested the payments pattern approach and demonstrated that by weighting the DSO through matching the unpaid receivables to the specific dollar sales which generated those receivables, companies could compute a "true" DSO, devoid of any seasonal "noise" in the calculated ratio.

This payments pattern approach could conceivably be extended to the days' inventory and days' payables components of the cash conversion cycle, providing a more effective measurement of the number of days in which cash was committed to non-cash working capital components.

The ability to give effect to such adjustments clearly requires access to levels of monthly transaction detail that are typically available only to management. However, with the appropriate level of detail, an improvement to the cash conversion cycle's accuracy is indeed possible.

There has been support in the literature for the superior effectiveness of the cash conversion cycle. In 1980, Richards and Laughlin questioned the validity of Beaver's (1970) assertion that the current ratio is highly correlated with corporate risk and suggested that the cash conversion cycle may be

superior to the current ratio, applying each tool in turn to the 1975-1978 Martin Marietta Corporation financial statements to bolster their view. This company's financial ratios provided more than a demonstrable correlation between Martin Marietta's liquidity trend and its cash conversion cycle trend – they showed that the traditional current ratio generated conflicting results suggestive of liquidity deterioration when, over the period under review, the reverse was true.

It was in a groundbreaking article that Gitman (1974) had introduced (and with Sachdeva (1982) later expanded upon) the cash conversion cycle used subsequently by Lancaster and Stevens (1996) and other researchers who sought to examine the usefulness of this dynamic liquidity tool in addition to the static current and quick ratios.

Companies can use the cash conversion cycle to measure and monitor corporate-wide initiatives to reduce the number of days during which company capital is committed to receivables and inventory while deferring vendor payments as long as possible. In practice, the ability to minimize the number of days in the cash conversion cycle must be balanced against industry practices and the need for strategic relationships with both customers and vendors.

Wertheim and Robinson (1991) conducted an analysis of the informational significance of accrual earnings and cash flow to assess liquidity. They concluded that accrual earnings had more explanatory power than cash flow measures. However, they used the current and quick ratio as the relevant cash

flow measures and acknowledged that their findings may not hold true for other measures.

Lancaster, Stevens, and Jennings (1998) built upon Wertheim and Robinson's study in two critical ways: They extended the study to more recent data and they used the cash conversion cycle in addition to the static current and quick ratios.

The results of their study have important implications for the issue under review in this research. The most significant comparative finding with regard to the Wertheim and Robinson study was to reverse the prior conclusion that cash flows from operations were not significant in explaining changes in the current ratio. Lancaster, Stevens, and Robinson concluded that the reverse may be true. Their study revealed high correlation with the current ratio. Of major significance was their finding that cash flows from operations were negatively correlated with the current ratio, directly contradicting the intended results of the current ratio.

This gives some weight to one of the findings in this writer's case study analysis that the current ratio can give conflicting signals about underlying liquidity. On the assumption that correlation can be demonstrated between cash flows from operations and the cash conversion cycle, Lancaster, Stevens, and Robinson demonstrated that an increase in such cash flows can be accompanied by a decrease in the current ratio and vice versa.

Logically, it is possible that current assets, an application of cash and the numerator in the current ratio, can increase at the same time that current liabilities, a source of cash and the denominator in the current ratio, decrease. These factors can thus erroneously give rise to an improving current ratio when cash flow from operations decrease as a result of the same factors.

Lancaster, Stevens, and Robinson further concluded that their research demonstrated a negative correlation between cash flows from operations and the cash conversion cycle. Since a decrease in the cash conversion cycle is regarded as an improvement in liquidity, their findings are consistent with this author's hypothesis and case study analyses.

There is one assertion in Lancaster, Stevens, and Robinson's study with which the researcher does not concur. In their introduction, Lancaster, Stevens, and Robinson argue as follows:

Current ratios and quick ratios are "static" measures of liquidity, based on forced liquidation of assets, and do not measure the ongoing ability of a firm to go from cash back to cash.

The researcher found their conclusion to be overreaching. Forced liquidation of assets, in the author's experience, typically yields lower cash generation than the balance sheet values assigned to them. However, the assumption that this distressed scenario is always implicit in the current ratio seems to be flawed. Current assets in profitable companies can generate, in the researcher's experience, cash flows that closely correspond to the underlying

balance sheet values, and these cash flows are applied to maturing obligations which include replenishment of non-monetary working capital components such as inventory. In such instances, the "cash-to-cash" flow of liquidity implicit in the current ratio is accurately represented at going-concern values, contrary to the assertions of Lancaster, Stevens, and Robinson, and the funds are continually reinvested in a relatively seamless flow. Hence the term "evergreen" which is sometimes used to describe revolving lines of bank credit that are advanced against such self-replenishing assets.

#### Dell Computer Corporation

The Dell Computer Corporation's use of the cash conversion cycle emerged during the researcher's updating of the literature review in September 2001. Two articles describing Dell Corporation's use of the cash conversion cycle were published after the author's preliminary proposal in 1997.

Therefore, unlike the AAD and IMSI case studies, the author performed only an updated and expanded quantitative analysis and undertook neither interviews nor in-depth industry and company-specific analyses. For this reason, the quantitative findings added further corroboration to the effectiveness hypothesis at an anecdotal level. It is possible, however, that additional research of Dell and its competitive position in the computer industry may either support the observed cash conversion cycle trends or offer unique factors that

gave rise to the trend in a manner that would not necessarily replicate with other companies or with Dell during different time periods.

Thomas Meredith, CFO of computer manufacturer Dell Computer Corporation (Nasdaq Ticker Symbol DELL), received CFO magazine's 1998 CFO Excellence Awards. According to CFO magazine (1998), Dell was grappling with growth management. The corporation was experiencing typical symptoms including bloated inventory levels, cash consumption and accounts receivables that were increasing at a rate faster than its revenue growth.

CFO magazine set the context for Meredith's challenges at Dell, as follows:

In 1993, Dell Computer Corp. chairman and CEO Michael Dell was ambling through London's Heathrow Airport with his newly minted CFO, Thomas Meredith, and was increasingly puzzled by the optimism in the finance executive's words. Those days, after all, couldn't have been darker for the Round Rock, Texas-based computer maker. The company was growing too fast, burning cash at a breakneck pace and it had posted a \$39 million loss the previous fiscal year. Under attack by securities analysts for its hedging practices, its stock price was plummeting from \$49 per share to \$16 per share. In the first six months of 1993, Dell had generated a \$66 million loss, attributable in part to inventory write-offs.

Meredith decided to use the cash conversion cycle (CCC) as a core performance metric. Dell instituted company training and programs to improve inventory turnover and customer collection rates, as well as to obtain more favorable credit terms from vendors.

As a result of this implementation, by 1994, the cash conversion cycle had improved to 40 days. By 1998 it was at less than negative 10 days.

According to CFO magazine, Meredith viewed the cash conversion cycle as addressing profit and growth management goals as well:

To bring about a better balance, Meredith identified the cash conversion cycle (CCC) as a key performance measure--one that, not coincidentally, has the concept of speed at its heart. "The balance between profitable growth and liquidity management is all about velocity," he argues.

Of significance to the writer's research, two observations about Dell are (1) the strategic context of the cash conversion cycle and (2) the comparison with the current ratio.

CFO magazine examined the larger context of performance management and shareholder value. According to the article, Dell began using return on invested capital (ROIC) as a broader measure of value creation, and tied executive compensation to this metric. Between 1995 and 1998, Dell's ROIC had, according to CFO, more than quadrupled.

On the related subject of competitive advantage, Gurley (2001) offered the strategic rationale, and benefit, of Dell's focus on the cash conversion cycle. Dell, by pursuing a price war, Gurley argued, forced competitors to face tough choices. Attempt to shore up market share by matching Dell pricing or stay out of the price war in the hope that it is not sustainable and will hurt the participating competitors. Dell's competitive advantage lay to some extent in their focus on the cash conversion cycle and competitors entering the price war without parallel liquidity management and metrics would, according to the article, do so at their peril.

The author agrees with the thrust of this argument, but found the following assertion by Gurley to be the result of an oversimplified understanding of the cash conversion cycle:

And others have noted that Dell's incredible five days of inventory allows it to pass on component price declines faster than anyone else in the industry. But perhaps the unique aspect of Dell's business advantage is its negative cash conversion cycle. Because it keeps only five days of inventories, manages receivables to 30 days, and pushes payables out to 59 days, the Dell model will generate cash - even if the Company were to report no profit whatsoever.

In the author's view, the cash-to-cash cycle of Dell cannot generate permanent positive net cash flows in a break-even environment. The net cash gain after a full cycle from raw materials procurement to receipt of cash from customers would only have a cash surplus equivalent to non-cash expenses such as depreciation and amortization, assuming such expenses were included in the break-even calculation. At the operating cash flow level, Dell would temporarily generate surplus cash flows – but only until accounts payable fell due.

Under the scenario cited by Gurley, the "cash holiday" would last for about 24 days ( $59 - (5+30)$ ). Using the summary financial statements of Dell extracted from the financial section of MSN.com (2001), the writer updated the findings of the CFO article (see Table 3) with a calculation of the current ratio and the cash conversion cycle for Dell's five fiscal years ending 2001.

Dell's cash conversion cycle and current/quick ratio comparison yield a case different from both AAD and IMSI but consistent with the author's

hypothesis. For the fiscal years 1999, 2000 and 2001, Dell's current and quick ratios declined. Over the same period, Dell generated growth in sales, profits and operating cash flow. For the entire five-year period, Dell's cash conversion cycle improved from 3 days to negative 15 days, lending additional support to the notion that the cash conversion cycle is more effective than the current ratio.

TABLE 3  
Dell Computer Corporation, Inc.  
Financial Statement and Liquidity Ratio Summaries 1997-2001

	2001	2000	1999	1998	1997
Sales	31,888	25,265	18,243	12,327	7,759
Cost of Sales	25,205	19,891	14,034	9,538	6,046
Operating Expenses	3,675	2,761	2,060	1,406	952
Receivables	2,895	2,608	2,094	1,486	903
Inventories	400	391	273	233	251
Total Current Assets	9,491	7,681	6,339	3,912	2,747
Accounts Payable	4,286	3,538	2,397	1,643	1,040
Total Current Liabilities	6,543	5,192	3,695	2,697	1,658
Current Ratio	1.45	1.48	1.72	1.45	1.66
Quick Ratio	1.39	1.40	1.64	1.36	1.51
Days' Sales Outstanding	33	38	42	44	42
Days' Inventory in Cost of Sales	6	7	7	9	15
Days' Payables Outstanding	(54)	(57)	(54)	(55)	(54)
Cash Conversion Cycle	(15)	(12)	(5)	(2)	3

## Conclusion

The writer, through literature surveys and critical analysis, has presented a comparison of the two methods to demonstrate at the philosophical level that the cash conversion cycle is a superior diagnostic and predictive tool for evaluating corporate working capital cash flows.

The static nature of the current ratio can provide a “false positive” when working capital initially stagnates. It offers a limited and sometimes misleading view of working capital liquidity.

The dynamic nature of the cash conversion cycle and its easier decomposition into critical operating decisions, provide persuasive arguments for adopting this technique instead of the current ratio. The author has concluded that at a minimum the cash conversion cycle is a necessary complement to liquidity analysis that can offer important insights into both operational and strategic aspects of a business.

## CHAPTER THREE

### Methodology

#### Overview

The author examined two companies over five-year periods in order to assess the effectiveness of each ratio in trend analysis over time, and as a useful strategic metric. In each instance, the five-year period under review covered specific planning horizons and periods of rapid growth.

#### Subjects

The researcher examined Associated Automotive Distributors (Pty) Ltd. and International Microcomputer Software, Inc.

AAD is a diversified automotive products corporation headquartered in South Africa.

Given this company's rapid growth over the period under review, together with its complex working capital components, the author evaluated the working capital cash flows of AAD using both the current ratio and the cash conversion cycle.

IMSI (NASDAQ Ticker Symbol IMSI) is a consumer software publisher headquartered in Northern California.

Similar to AAD, IMSI also underwent rapid growth during the period under review. Unlike AAD, however, IMSI was never able to generate significant cash balances from its operations. IMSI also operated as a publicly traded company and was therefore subject to analyst scrutiny and the dynamics of the NASDAQ market.

### Instruments

The author utilized three ratios to analyze the liquidity trends of each subject: (1) the current ratio, (2) the quick ratio, and (3) the cash conversion cycle.

### Procedures

#### Associated Automotive Distributors Case Study

The researcher examined the extent to which the company's liquidity ratios were able to differentiate between growth-driven increases in non-liquid working capital and increases attributable to other factors.

This study also examined the overall strategy and execution of AAD in its market segments over the same period within the broader context of shareholder value, in order to demonstrate the analytical power of the cash conversion cycle from a strategic perspective.

Richard Bort (1989) suggested that while working capital liquidity management should be proactively forecast and monitored by all corporations, this function is more often undertaken by "borrowers" (companies that need to borrow funds to finance working capital). He contends:

Nevertheless, some managers erroneously believe that when they cross the line from being a borrower to being an investor they no longer need to be so attentive to working capital. It pays to maintain tight controls over working capital regardless of whether the firm is a borrower or an investor.

The AAD case study offered a perspective on a company that in some years had a growing cash balance. AAD generated growth in its cash balance, before dividends, in 1995.

The relevance of the writer's research on this aspect was to demonstrate the reliability of the cash conversion cycle to the financial manager during both net borrowing and net investing periods.

The researcher examined AAD over the period 1992 through 1996 utilizing the consolidated audited financial statements for the fiscal years ending 30 April of each year. AAD generated sales of R131 million in fiscal 1992 that grew to R265 million by fiscal 1996 (R = Rand, the unit of South Africa's currency).

The Company confirmed that the preparation of AAD's financial statements was conducted in accordance with South African GAAP (generally accepted accounting practice).

Although income and balance sheet format and captions differ from United States GAAP, the differences are considered by the author to be largely form and not substance. For the purpose of sufficiency in potential future research that may draw upon this work, the author has nevertheless outlined the details of these differences and their treatment for this study.

The writer gave effect to some changes in AAD's financial statement presentation for the purpose of expressing them in a format comparable to USA financial accounting standards.

AAD's balance sheets, were originally prepared in the following South African GAAP sequence: (a) Capital Employed, comprising Fixed Assets (displayed first), followed by Current Assets and Current Liabilities (displayed in reverse order compared to USA GAAP, beginning with non-monetary liabilities and ending with lines of credit and other bank borrowings), yielding Net Assets as a balance sheet total. (b) Employment of Capital, comprising shareholders' equity and long term liabilities (displayed in reverse order compared to USA GAAP), yielding the corresponding balance sheet total which equates to the Net Assets above.

TABLE 4

Associated Automotive Distributors (Pty) Ltd.  
Income Statement Summaries 1992-1996  
(R millions)

	1992	1993	1994	1995	1996
Sales	131.4	140.0	186.0	213.0	265.0
Cost of Sales	106.4	105.0	139.5	159.7	198.7
Gross Profit	25.0	35.0	46.5	53.3	66.3
Operating Expenses	15.1	26.9	38.7	41.1	55.3
Operating Income	9.9	8.1	7.8	12.2	11.0
Interest and Income Taxes	0.0	3.2	2.3	2.3	0.6
Net Income / (Loss)	9.9	4.9	5.5	9.9	10.4

AAD's Income Statements, as shown in Table 4, were presented in a sequence substantially identical to that required by USA GAAP and therefore bear no further discussion.

Of significance only to the ratio definitions used in the author's research, the following AAD financial statement captions were adapted to USA equivalents as follows: (a) Balance Sheet items Stock, Debtors and Creditors were renamed Inventory, Receivables and Accounts Payable; (b) Income Statement item Turnover was renamed Sales.

The additional adjustments were as follows: (a) Balance Sheet Shareholders' Loans were included in Shareholders' Equity (see Table 5). This treatment was considered appropriate since in the writer's experience, shareholder loans in privately held companies with unspecified interest rates and repayment terms are effectively part of the permanent capital of the corporation. (b) Investments were included in Fixed Assets because their nature was more

long-term and these assets were neither employed nor funded by any working capital assets or liabilities. (c) Bills Payable were included in Current Liabilities because AAD negotiated these short-term instruments with automotive manufacturers solely to fund the vehicle assemblies and components that were included in AAD's inventories. (d) Profits disclosed in AAD's financial statement summaries for the five-year period are Net Profits After Tax but before Extraordinary Items and Dividends.

TABLE 5

Associated Automotive Distributors (Pty) Ltd.  
Balance Sheet Summaries 1992-1996  
(R millions)

	1992	1993	1994	1995	1996
<b>ASSETS</b>					
Cash	0.0	0.0	0.0	18.2	0.0
Receivables	25.9	24.3	33.5	23.2	43.3
Inventory	33.2	44.0	40.6	18.1	79.5
Total Current Assets	59.1	68.3	74.1	59.5	122.8
Fixed Assets	23.1	15.4	14.7	13.8	13.0
	82.2	83.7	88.8	73.3	135.8
<b>LIABILITIES AND SHAREHOLDERS' EQUITY</b>					
Line of Credit	6.0	7.0	3.5	0.0	29.0
Accounts Payable & Accruals	19.5	24.9	31.9	16.7	38.5
Total Current Liabilities	25.5	31.9	35.4	16.7	67.5
Long Term Liabilities	0.0	0.0	0.0	0.5	2.3
Total Liabilities	25.5	31.9	35.4	17.2	69.8
Shareholders' Equity	56.7	51.8	53.4	56.1	66.0
	82.2	83.7	88.8	73.3	135.8

The writer sought to present a profitability trend for the Company that was not distorted by unusual one-time transactions. (e) Preference Shareholder Capital was included in Shareholders' Equity. This classification was implemented to simplify the presentation of the five-year performance of AAD and the researcher believes a separate classification would have served no useful purpose for this study, particularly considering the focus on short-term assets and liabilities, rather than on long-term capital structure. (f) AAD's line of credit balance in 1992 was derived by deduction from divisional balance sheets provided to the author. In order to test the potential impact of error in this reconstruction, the author computed the five-year trend under the most extreme assumption of a zero 1992 line of credit balance. Under this assumption AAD's liquidity trends remained unchanged.

#### International Microcomputer Software Case Study

IMSI's working capital components were also complex, primarily as a result of industry practices that impacted receivables and inventory. The writer assessed the working capital cash flows of IMSI using both the current ratio and the cash conversion cycle. This study, as in the case of AAD, examined the overall strategy and execution of IMSI in its market segments over the same period within the broader context of shareholder value, in an attempt to

demonstrate the analytical power of the cash conversion cycle from a broader perspective.

The author studied IMSI for the periods fiscal 1994 through fiscal 1998. The publicly available SEC quarterly and annual filings of this Company were reviewed for the purposes of this research. The author was subsequently appointed as an executive director of the Company (1999 and 2000), and is signatory to certain confidentiality agreements. In order to honor the letter and spirit of these agreements, the author purposely confined this study to public domain industry and corporate information for the period under review.

IMSI was required as a NASDAQ-listed corporation to present audited financial statements prepared in accordance with USA GAAP for the five-year period under review, as shown in Table 6 and Table 7. Accordingly adjustments similar to those effected for AAD were not needed.

TABLE 6

International Microcomputer Software, Inc.  
Income Statement Summaries 1994-1998  
(\$ thousands)

	1994	1995	1996	1997	1998
Sales	23,118	20,300	25,679	41,839	62,472
Cost of Sales	7,745	7,144	8,262	16,893	23,382
Gross Profit	15,373	13,157	17,417	24,946	39,090
Operating Expenses					
Sales and Marketing	11,040	8,919	9,888	12,026	18,611
General and Administrative	2,628	2,457	2,557	3,988	5,005
Research and Development	1,152	2,151	3,171	4,565	8,614
Write off Purchased R & D	0	0	0	0	6,367
Total Operating Expenses	14,820	13,527	15,616	20,579	38,597
Operating Income / (Loss)	553	(370)	1,801	4,367	493
Other Income (Expense), net	20	(54)	262	130	759
Income (Loss) before Taxes	573	(424)	1,539	4,237	(266)
Provision for income Taxes	253	11	585	1,640	(148)
Income (Loss) after Taxes	320	(435)	0	0	0
Effect of Accounting Change	800	0	0	0	0
Net Income / (Loss)	1,120	(435)	954	2,597	(118)

TABLE 7

International Microcomputer Software, Inc.  
Balance Sheet Summaries 1994-1998  
(\$ thousands)

	1994	1995	1996	1997	1998
<b>ASSETS</b>					
Cash	521	523	387	1,126	2,093
Receivables	2,092	2,590	4,121	7,536	13,149
Inventory	1,260	1,626	2,538	3,473	6,549
Prepaid Royalties and Licenses	165	336	747	1,285	2,517
Deferred Direct Mail Costs	546	358	0	0	0
Deferred Tax Assets	417	321	791	1,472	1,762
Other Current Assets	133	183	480	478	759
Total Current Assets	5,134	5,938	9,064	15,370	26,829
Fixed Assets	832	837	1,101	1,693	3,430
Deferred tax assets	411	412	344	265	2,676
Capitalized Development Costs	979	245	0	92	2,101
Intangibles	40	40	549	153	314
	7,396	7,470	11,058	17,573	35,350
<b>LIABILITIES AND SHAREHOLDERS' EQUITY</b>					
Line of Credit	605	400	232	0	7,948
Short term debt	0	0	0	402	842
Accounts Payable & Accruals	2,813	3,139	3,077	4,501	6,915
Other current liabilities	245	245	334	0	0
Current portion of notes payable	0	0	264	558	1,434
Payroll and sales tax payable	187	187	1,055	515	932
Contracts payable	0	0	1,011	1,318	1,621
Income taxes payable	0	0	0	742	313
Total Current Liabilities	3,850	3,971	5,972	8,036	20,005
Long Term Liabilities	153	103	565	2,042	1,682
Total Liabilities	4,003	4,073	6,537	10,078	21,687
Common stock	5,425	5,864	5,973	6,453	12,718
Accumulated deficit	(1,743)	(2,177)	(1,224)	1,373	1,255
Cumulative translation adjustment	(24)	(24)	66	(46)	(25)
Notes receivable from shareholders	(265)	(265)	(293)	(285)	(285)
Total shareholders' equity	3,393	3,397	4,522	7,495	13,663
	7,396	7,470	11,058	17,573	35,350

The SEC filings on record for IMSI present only summary information for the 1994 fiscal year balance sheet. The author therefore reconstructed the detailed 1994 balance sheet accounts using the 1995 balance sheet and statement of cash flows. The reconstruction produced some variances in current asset and liability totals which were cumulatively less than 10% of total assets. The writer considers this variance to be acceptable since (a) 1994 is the beginning year of a strategy and trend whose focal point for the central hypothesis in this work culminates in later years (1997 and 1998), and (b) the entire variance was tested for significance by adding it to and subtracting it from current assets and current liabilities. Neither calculation reversed the originally computed current ratio or cash conversion cycle trend.

For the purpose of sufficiency in potential future research that may draw upon this work, the author has included the financial statement section of each form 10-K in Appendix B.

The writer made the following observations about IMSI's financial statements for the period under review: (a) Although unrelated to the balance sheet items used for the purposes of the liquidity ratio calculations in this study, the following asset items had zero balances for some of the five fiscal years under review: deferred direct mail costs and capitalized software costs. (b) The following liability items had zero balances for some of the five fiscal years under review: credit line payable, current portion of notes payable, wages, benefits and sales tax payable, contracts payable and income taxes payable.

A zero balance may have logical reasons for its inclusion in financial statements over several time periods, such as zero taxes payable arising out of zero or taxable income, or a zero line of credit balance in a year where the credit line was not in existence or was not utilized at the reporting date.

The author therefore did not pursue each instance in IMSI's financial statements, relying instead on the rigor of both audit and SEC scrutiny as assurance that these were not omissions or misclassifications in the financial data.

## CHAPTER FOUR

### Results

#### Associated Automotive Distributors (AAD)

##### Strategic Profile

In 1994 AAD articulated a quest for a position in the year 2000 of a billion Rand company with an automotive group at its center, but diversified into allied businesses in which AAD could logically project its core competencies. By 1996, AAD's management team decided to conduct a strategic review. An analysis of AAD's financial information within the context of strategy enabled the author to review how recent financial performance reflected the result of some of the directional changes AAD had chosen for its initiatives as a corporation "reborn" out of the loss of the Land Rover franchise in 1994.

AAD's financial track record offered a view of how it had managed problems and opportunities. The writer sought critical insights that might help AAD to navigate the planned direction of the Company.

By 1996 AAD had progressed through many transitions in just five years. The Company began the period as a Leyland UK automotive spin-off. It transitioned to a formidable niche player in the South African SUV (Sports Utility

Vehicle) market, and was targeting to become a diversified industrial group before 2000.

Annual sales had increased at an average rate of 19%, taking the Company from R131 million to R265 million in 1995/6. The growth was strong on its own, but considering that in years such as 1995/6, a major segment of the sales (the Dacia automobile) was generated from a zero base and not from the prior year's momentum, the relatively steady expansion appeared to be even more impressive.

#### Factors Affecting Liquidity

The management of this expansion had varied from superior to problematic, in large part because of the changes in South Africa's socio-political macro environment, the automotive industry and the competitive environment. In absolute terms, AAD has survived and thrived, but as the Company sought to achieve the longer term goals articulated in 1994, they recognized the need to "stretch" toward some benchmarks and set a higher standard of performance beyond survival, profitability and growth.

AAD was facing liquidity management pressures for the first time in its history (see Table 8). Interestingly, even though interest-bearing debt at 21.4% of the asset base was by 1996 the highest in five years and had mushroomed from R3.5 million two years prior to R29 million, it still represented a 44% debt-

to-equity ratio with a times interest earned exceeding 5:1, comfortably ahead of typical South African bank loan covenants of a 1:1 debt-to-equity ratio and times interest earned of 3:1. The underlying issue was whether the debt had been deployed effectively to create shareholder wealth.

TABLE 8

Associated Automotive Distributors (Pty) Ltd.  
Liquidity Ratio Summaries 1992-1996

	1992	1993	1994	1995	1996
Current ratio <sup>a</sup>	2.3	2.1	2.1	3.6	1.8
Quick ratio <sup>a</sup>	1.0	0.8	0.9	2.5	0.6
Days' Sales Outstanding <sup>b</sup>	72	63	66	40	60
Days' Inventory in Cost of Sales <sup>b</sup>	114	153	106	41	146
Days' Payables Outstanding <sup>b</sup>	(59)	(69)	(65)	(30)	(55)
Cash Conversion Cycle <sup>b</sup>	127	147	107	51	150

<sup>a</sup> Calculations rounded to one decimal point.

<sup>b</sup> Calculations rounded to the nearest whole number.

## Liquidity Analysis

The central issue was how to optimize liquidity management. To accomplish this, management at AAD needed effective tools for evaluating working capital cash flows.

In fact, without such tools, AAD was concerned it could as easily be too conservative with capital employed in the business and risk looking back on its expansion as executed with under-employed capital, caused by a loss of working capital focus and a capital base whose growth potential had failed to materialize.

The positive side of an overly conservative capital structure would logically be its ability to withstand some severe turbulence in the market place. But from a forward planning point of view, this reasoning, according to one manager, was “about as comforting as hoping to win a championship boxing tournament, not because you can compete best, but because you have a supreme ability to take punches.”

This “loss of bearings” created a sense of urgency to focus and redeploy assets with a sound set of liquidity management metrics.

Other than when AAD had generated the unusual and sizable cash inflow from winding down a major business unit (Land Rover) in 1994 and 1995, working capital cash needs had tended to put strain on the cash generated by depreciation-adjusted profits.

The author first consulted with AAD in 1993. Management and AAD’s bankers were not fully persuaded that the cash conversion cycle was effective,

but they agreed to “parallel track” the cash conversion cycle with the current ratio.

From 1993 to 1995, AAD conscientiously steered the working capital base down from 147 to 51 days. Allowing for the wind down of the Land Rover franchise in 1995, the trend was reversed, with the cycle increasing again to 150 days in 1996.

Under a more highly leveraged capital structure, AAD might have encountered unmanageable cash constraints. Of critical importance here is the additional corporate cash “cushion” in the form of an assessed tax loss that shielded AAD from more sizable tax cash outflows, as well as a negotiated plant lease at a nominal annual rental.

The importance of these factors was not to criticize line managers for erratic working capital management but to highlight the presence of cash flow benefits which would not exist indefinitely and may have “anaesthetized” AAD from potential critical cash flow crises in those years.

A critical analysis was needed in order to identify the underlying causes of the buildup in illiquid assets.

Was the increase simply a spontaneous working capital reaction to growth? Contributing factors to the liquidity problem might be market-related: an overcrowded industry, strong price competition, or economically anxious buyers.

Alternatively the source of the underlying build-up could be franchise-related: wrong products for the chosen segments, overpriced products relative to its competitors, inadequate quality for the price positioning, or a dealer development strategy that was too stringent in its terms of trade for achieving viable sales volumes.

The dominant factor could also be management related: inadequate market research, ineffective selling and promotional activities, sales forecasting problems, insufficient linkage between sales forecasts and production schedules, uneconomic order quantities and/or component mix, or operational problems in terms of the timing and sourcing of products and components.

If management-related, corrective action would be difficult but manageable. If franchise-related, renegotiation (and reeducation of franchisors about the South African market place) was more difficult but possible. If market-related, AAD's swift exit from the non-viable segments, reinforcement of profitable or promising segments and new product-market opportunities to fulfill its growth plans was most difficult, but most urgent.

From 1994 to 1996 the working capital base expanded from 107 to 150 days - what happened and how did it impact AAD's working capital cash flows?

AAD management initially put forward the view that the buildup was no more than the "winding up" of working capital to support the R265 million sales base - the flip side of the Land Rover "wind down" which generated cash flow of R20 million in 1995. AAD's bankers accepted this point and were more

concerned about AAD's ability to manage the rate of sales growth than the nature of the working capital growth. The author believed that this non-liquid working capital build-up was attributable to more than growth capital by about R17 million.

The one issue on which there was finally universal agreement by management and AAD's bankers by 1996 was that the current ratio offered little assistance in evaluating the Company's working capital cash flows.

The researcher analyzed AAD's 1996 performance trends over a two-year cycle in order to eliminate the intervening aberration caused by the sale of the Land Rover franchise. In simple terms, applying AAD's 1994 working capital base of 107 days to its 1996 sales volumes, growth would account for only 43% or R18 million of the R42 million increase in receivables and inventory, net of accounts payable. In other words 57% or R24 million was attributable to growth "slippage" - increases in working capital over and above the level to which working capital would spontaneously rise with the level of sales.

The author accepted that this analysis measured just one dimension of a vastly more complex problem, but again, if AAD had been managing liquidity in a pure "growth capital" scenario, there would be R24 million less in non-cash working capital and the bank debt of R29.0 million would have been lower by the same amount.

Before moving from history to the 1996 strategic situation analysis, the author briefly tested the value created by AAD's strategy over the five-year period.

Without looking at the more subjective economic and market value measures, the author examined the accounting Return on Assets (ROA). Measured as net profit / total assets, the first ROA prerequisite was to evaluate AAD's profitability on an after tax basis. This not only eliminated the uncontrollable "limited shelf life" tax loss or "shield," but it also provided a basis for equivalent comparison with competitors.

Restating AAD's performance on an after-tax basis, ROA's had ranged from 5.9% to 9.0%. In searching for a comparative analysis, the author chose Toyota South Africa, because the Company offered broad similarities since there was no publicly traded AAD "look alike." Similarities included reasonably similar net margins and asset turns, somewhat stagnant value creation, 25% sales growth in 1995, approximately 30% debt to assets, and a large buildup in inventory. Toyota produced ROA's around 4%, while AAD produced ROA's averaging approximately 7% over the same period.

Of more interest was their asset management. While Toyota appeared to be mired in some stagnant performance, it had held the line on cash flow, producing a near-break even 0.2% cash flow return on investment (CFROI). Over the same period, AAD produced a CFROI of -8.2 %.

In summary, for every one step forward in accounting return, AAD took two percentage steps back in cash flow return.

The performance similarities may have indicated industry-wide problems which prevailed such as an overcrowded market, high interest rates and consumer hesitancy, i.e. a market problem, not a management problem.

Applying the average Toyota price-to-earnings (P/E) ratio, adjusted by 30% for lack of direct comparability and liquidity, the author estimated a price per AAD share of R2.00.

Thus, at a value of approximately R2.00 per share, this rough calculation suggested that the economic value of AAD had not been enhanced by the 1996 performance (the 1996 net asset value was approximately R2.64 per share).

The author had earlier in 1996 performed a more detailed valuation using CAPM (the capital asset pricing model) which substantially corroborated the R2.00 per share valuation, but excluded this from the current research since the CAPM methodology and detail is tangential to this study's central focus and well beyond the scope of the research topic.

The analysis gave some weight to management's previous concerns about the deeper strategic problems facing AAD as reflected in the quality of its earnings. The numeric sales growth had apparently added no value to the Company.

AAD had set sales targets of rapid growth during an October 1994 strategy session - in essence to double in sales by 1998 (R440 million) and again

doubling by 2000 to R1 billion. The path to this growth was projected to be fueled by the automotive sector. The Company hit the 1996 sales target in 1995 and reached 90% of the 1997 sales target in 1996.

At the time of the strategy session, AAD had identified three critical gaps that stood in the way of translating these goals into shareholder value: (1) scaling systems and dealer infrastructure with the rapid growth, (2) raising sufficient capital to fund the growth, and (3) successfully managing the growth in order to create shareholder value.

Securing dealerships and infrastructure building expertise were put to the test a year ahead of schedule, followed closely by the growth capital gap, which, too, was successfully overcome. The central question in 1996 was how well had the next gap, growth management, been addressed?

Subsequent to the cash conversion cycle analysis, management at AAD concluded that the quality of AAD's latest growth was unsustainable and another year like 1996 might arguably threaten the Company's liquidity and viability.

They unanimously agreed that the next sales target per the 1994 strategy had to be deferred. The plan had originally called for a doubling of the Company's sales to R440 million, which was predicated on a strong and continuing balance sheet that in 1994 had sufficient debt capacity. Fortunately, since the Company was one year ahead of plan, AAD could stay on track even if it committed to 1997 as a year of focus, to consolidate and regain momentum.

Instead of targeting an earnings-based forward plan, management committed to an equally balanced focus on a liquidity policy targeting working capital cash flow neutrality as the ideal. This required an aggressive renegotiation of terms from the major automotive franchises, effectively transferring more product and credit risk away from AAD back to the manufacturer.

Management postulated that AAD could fund the 1997 growth internally, and in the process cut AAD's bank exposure in half, by placing the automotive franchisors in a comparable risk posture on similar terms to what AAD enjoyed in 1994.

In a sense, the liquidity analysis risked predetermining AAD's investment strategy. In order to test the reasonableness of fit between a focus on the cash conversion cycle and AAD's strategy, the author reviewed AAD's strategic analysis of Dacia, a new European automotive franchise investment in February 1996 that formed the core of its strategy.

The Dacia automobile offered AAD the promise of a curious market segment - not the typical uniquely customized, high end, high price brand that AAD typically offered. Instead, Dacia offered dominance of the 16,000 unit "bargain price" market. Prices were low, but costs were even lower so a high-end margin was possible from a low sales price.

Because of enduring quality problems, the company was analyzing whether Dacia could be a viable business in the long term. AAD had established

a three-year sales goal of 4,000 units a year. This represented 25% of the market segment. As such their 20% criterion for niche dominance seemed to be achievable but acceptable quality, parts availability, and after sales support remain crucial.

The logical strategic focus was therefore not market penetration but market perception. Separate brands notwithstanding, there was a real danger of customers associating AAD with the older technology and reliability problems of the Dacia that had begun to surface in 1996. The concerted effort underway to address these problems was therefore an "AAD" and not simply a "Dacia" problem. The reality that AAD had successfully managed several other high-end business niches seemed less significant than the perception that it was beginning to market vehicles with quality problems.

Management argued that the risk premium in the high margins could probably compensate for Dacia standalone product risk – the more compelling question was whether it could compensate for any spill over risk to AAD's image.

Management ultimately determined that the risk was unacceptable and AAD exited from the market. Of importance to this study was how the cash conversion cycle was utilized as one of the frameworks for strategic analysis.

Management identified many risks associated with Dacia that would have the effect of extending the Company's cash conversion cycle: (a) quality problems would force rework of defective units, (b) superimposing an extensive quality assurance team would add several days to the cash conversion cycle at a

point in the cycle where the Company would be carrying the largest proportion of non-cash working capital, (c) warranty problems would increase the component inventory levels needed to support the product, (d) reputation problems would hinder branding strategies and force the Company to work with weaker dealerships, and (e) the cumulative effect of these risks would force AAD to offer more generous credit terms with weaker credit standards for customer approval.

This strategy exercise demonstrated the versatility of the cash conversion cycle. It had been successfully used to thoroughly evaluate a product investment from design of the blueprint to receipt of cash from the sale of a vehicle.

The most pressing tactical constraint line challenging AAD in 1996 was now liquidity management. The cash conversion cycle offered valuable and consistent insights as well as providing the foundation for management and corrective action. It ultimately provided decision support as a tool for optimizing AAD's working capital within the context of evaluating corporate strategy.

By contrast, the current ratio offered a broad, vague and sometimes conflicting signal of liquidity without the ability to provide the level of analysis offered by the cash conversion cycle.

During management's quest for the right strategic and financial decision, the author concluded that the cash conversion cycle had demonstrated its effectiveness as a superior liquidity and strategic analytical tool.

## International Microcomputer Software, Inc. (IMSI)

### Strategic Profile

IMSI was founded in 1982. By the mid-1990s, it had become a profitable, fast-growing international software publisher with annual sales of \$60 million. The US Company employed more than 200 people and was headquartered in San Rafael, California. IMSI operated out of a rented facility with additional technical support in Albuquerque, New Mexico and a warehouse in Richmond, California. IMSI had wholly-owned subsidiaries in Europe, South America, Africa, Australia and Russia. Subsidiaries contributed 40% of the Company's consolidated sales.

IMSI described itself in its 1998 annual financial statement filing with the SEC as a developer and publisher of PC productivity software in the business applications, utilities and visual content categories targeted for small businesses and consumers. The Company sold its products in 13 languages to 60 countries. The Company's best-known product families were TurboCAD in the business applications category, Floorplan in the home design category, WinDelete in the utilities category and MasterClips in the visual content category. The Company sold approximately 2.2 million units of its software in fiscal 1998 compared to 1.8 million units sold in fiscal 1997.

At the time IMSI's focus was in desktop tools beyond the ubiquitous word processing, spreadsheet, electronic mail and database applications. IMSI sought to enhance productivity in areas such as precision drawing, forms automation, project management, scheduling and voice recognition. The Company targeted applications that appeal to a broad variety of desktop users in categories it determined were under-served by major software vendors.

IMSI's worldwide distribution channel was primarily the retail channel. The Company had expanded its retail channel from approximately 3,000 stores offering up to three of its products at the end of fiscal 1995 to over 12,000 stores offering up to 40 of its products as of June 1998. IMSI additionally sold its products through strategic partners and direct mail and was expanding its distribution channels to include direct sales to corporate accounts. The Company hoped to take advantage of the distribution opportunities presented by the Internet.

IMSI's growth strategy had been based in part on aggressive acquisitions. These were primarily focused on product line depth and breadth. IMSI moved from direct distribution to wholesale retail channels in 1996. This decision was designed to achieve distribution efficiencies and in part to enable it to manage the larger volume throughput generated by its growing product mix and market share.

In its public filings, IMSI stated its intent to continue its pursuit of both organic and acquisitive growth in the medium term.

IMSI experienced rapid growth over the period under review, attributing this in its public filings to the successful execution of its strategy, including the following key elements: (a) expansion of its product to a large and diverse customer base by continuing to support and upgrade its products and by introducing multiple versions of its products with a range of prices and functionality that were attractive to different market segments; (b) the creation of new product franchises by developing, licensing and acquiring products in growing segments of its existing product categories where it believed it could capture market share with improved technology, lower prices or its extensive distribution network; (c) the exploitation of the rapidly-expanding installed base of PCs used by small- and medium-sized businesses, enabling the Company to deliver superior products and services designed to meet the needs and address the concerns of these businesses. The Company's productivity applications were designed to accomplish cost-effectively a variety of routine tasks regularly performed by a broad range of small- and medium-sized businesses to help entrepreneurs enhance productivity and competitiveness; (d) the effective leverage of global distribution to sell its products in North America through over 12,000 retail locations and in approximately 60 other countries through an established international distribution network of subsidiary offices and a number of distribution relationships. International sales represented 30% of the Company's net revenues in fiscal 1998 as compared to 41% in fiscal 1997 and 34% in fiscal 1996. The Company expected that its international revenues would

continue to account for a significant percentage of its net revenues. The Company planned to continue to expand both the number of products distributed in international markets and its sales and marketing offices and distribution relationships within those markets; (e) the continued focus on branding. The Company believed that brand awareness was a key factor in software purchase decisions and that, by increasing its marketing efforts, the Company would increase its market share and encourage customer loyalty and repeat purchases. IMSI planned to increase its brand equity and visibility through marketing and promotions, including public relations, retail promotions, trade shows, direct marketing, telemarketing and strategic relationships; (f) the drive to develop a strong global presence in the retail distribution channel, focusing on establishing other distribution channels, such as sales to corporate accounts and sales via the Internet; (g) a dedicated focus on products that could be identified for Internet distribution.

IMSI was publicly traded under the same ticker symbol on NASDAQ. Its stock price at the end of fiscal 1998 was \$16, within the upper range of its 12-month moving average. IMSI served five segments in off-the-shelf PC software: CAD, Consumer, Desktop Publishing, Office and Utilities.

## Factors Affecting Liquidity

By 1998 the Company had established a track record of profitability in three of its last five fiscal years, with sales growing from \$23.1 million in 1994 to \$62.5 million in 1998. Profitability grew from \$1.1 million in 1994 to \$2.6 million in 1997 but slipped to -\$0.1 million in 1998. (See Table 6.)

IMSI was fast approaching critical mass in certain markets and by 1997 and 1998 it had developed an impressive momentum. But as the Company approached the \$100 million sales level and the year 1999, a focus on sustainable, profitable growth would ultimately require a systematic corporate-wide endeavor to plan and control liquidity, without sacrificing the flexibility which had in part enabled swift, entrepreneurial execution in the marketplace.

Total assets grew from \$7.4 million in 1993 to \$35.4 million in 1998, while the corresponding value of current assets grew from \$5.1 million to \$26.8 million. Primarily as a result of the growth in current assets mentioned above, operating cash flow consumed by working capital more than quadrupled between fiscal 1996 and 1997 by \$4.1 million, outpacing the cash flow generated from depreciation-adjusted profit for the first time in five years.

IMSI's dramatic growth in working capital appeared to account for much of the cash drain. Further examination of the key working capital components, receivables and inventory provided insights into the underlying dynamics and their impact on IMSI's liquidity.

IMSI's management of receivables was impeded by the complex and unfavorable industry practice among the Company's major customers in terms of which settlement of accounts was triggered exclusively by customers' buyers who authorized payments on account based on retail sales and not by date due for payment.

In reviewing IMSI's public filings, the author observed that according to management IMSI allowed distributors to return products in exchange for new products, or for credit toward future purchases, as part of stock balancing programs. Also, IMSI provided price protection to distributors when the Company reduced the price of products. End users could return products through dealers and distributors within a reasonable period from the date of purchase for a full refund. Retailers could return older versions of products.

These practices were not uncommon in the software industry. IMSI accordingly made these allowances to remain competitive with other software manufacturers. The Company also incurred shipping, handling and refurbishment costs associated with receiving returns and processing them for resale. These risks had the potential to significantly reduce the profitability of these agreements with their largest accounts.

A traditional view of effective liquidity management may have paralleled the approach taken by banks that IMSI use best-practice metrics with competitors' current and quick ratios as benchmarks in order to meet or beat the corresponding loan covenants. That framework of system improvements and

management by "best practice" objectives, however, may have left management with the perception that cash flow "is what it is," namely a byproduct of doing business in the software industry, with the only real requirements being to adhere to their bank's loan covenant ratios. As such, IMSI would continue to be managed with a priority on profitability and growth - negative cash flow, within the constraints of the abovementioned working capital metrics, might be regarded as a necessary "evil" in any rapid growth company. Simply put, liquidity management and a focus on working capital cash flows would not be a sufficiently high priority because (1) it could be expected to be negative as IMSI continued to fund a rapid and aggressive growth strategy, and (2) it could not be projected, much less directly managed, with any useful degree of accuracy other than as a byproduct of receivables and payables payment terms.

### Liquidity Analysis

In reviewing IMSI's financial statements, the author concluded that the traditional working capital ratios would not have been of much help to a rapid growth company such as IMSI. The (cash) burning issue in a 30%+ growth environment was less a function of a static balance sheet relationship than of the rate of growth in working capital relative to sales and the Company's cycle time to convert working capital to cash.

As illustrated in Appendix B, IMSI's current ratio includes so many disparate, even intangible, elements such as prepaid and deferred transactions and provides no linkage at all to sales, resulting in a current ratio calculation that is a crude, broad indicator at best, and the wrong signal at worst. The current ratio trend shows improvement in 1996 and 1997, only declining in 1998, even though working capital cash flow deteriorated during all three years. In a concrete demonstration of the superior effectiveness of the cash conversion cycle, the cash conversion cycle (see Table 9) deteriorated over the same period, increasing the number of days during which operating cash funds are committed to working capital from 73 days to 136 days.

TABLE 9

International Microcomputer Software, Inc.  
Liquidity Ratio Summaries 1994-1998

	1994	1995	1996	1997	1998
Current ratio <sup>a</sup>	1.33	1.50	1.52	1.91	1.34
Quick ratio <sup>a</sup>	1.01	1.09	1.09	1.48	1.01
Days' Sales Outstanding <sup>b</sup>	33	46	58	65	76
Days' Inventory in Cost of Sales <sup>b</sup>	59	82	111	74	101
Days' Payables Outstanding <sup>b</sup>	(45)	(55)	(46)	(43)	(40)
Cash Conversion Cycle <sup>b</sup>	46	73	122	96	136

<sup>a</sup> Calculations rounded to two decimal points.

<sup>b</sup> Calculations rounded to the nearest whole number.

The working capital build-up in 1998 was approximately 22 days longer than the 114-day average of its primary competitor, AutoDesk. At average daily sales of approximately \$174,000, IMSI's extra days of non-cash working capital required financing of approximately \$3.9 million.

Thus IMSI appeared to have utilized almost 50% of its \$7.9 million line of credit in fiscal 1998 to fund excess working capital, not growth capital.

This growth in non-cash working capital may have been caused by a combination of conscious management decisions to commit resources well ahead of new products and projects (an investment decision), a loss of focus on working capital management (a management challenge), and unfavorable industry terms of trade (a market reality for smaller software companies).

Faced with this problem, what might IMSI's management team have done differently? As shown in Table 9, the current ratio had begun to decline by 1998 but this ratio offered IMSI's line management little guidance about possible corrective action. A ratio such as 2:1 or 1.5:1 conveys a rudimentary trend at best, but provides no operational metrics that can initiate corrective action.

By contrast, the cash conversion cycle pinpointed where IMSI's management should have focused their attention.

At 76 days' sales, the Company's 1998 receivables highlighted potential credit and collection actions to reduce that metric, including: (1) potential margin improvement through better pricing for its best-selling products; (2) potential carrying cost improvements through better terms of trade such as (a) effective

net payment of 60 days or less; (b) agreement to deadline for return of product within 90 days; (c) establishment of standards for returns such as handling fees, pallet configuration and routing, and agreement that return credits cannot be claimed until physical receipt of returns is confirmed; (d) limitation on exposure to freight charges; (3) system changes to extend inventory and receivables tracking into the distribution channel unless and until more restrictive return policies can be negotiated; and (4) structuring price protection based on unsold product at retail stores, not on inventory levels at distribution centers.

IMSI had switched emphasis in 1996 from direct to channel distribution. Typical industry practice in consumer software entails market support for the channel in the form of cooperative advertising and price protection as the software price tapers off with the short life cycle. Industry practice also provides distributors with aggressive product return options. Rates in the industry vary from 10-15% to as much as 35-50%.

IMSI had accounted for these factors by providing return (approximately 11% of sales) and price protection reserves (approximately 4% of sales) above the line (reducing gross sales to net) and cooperative advertising reserves (approximately 5% of sales) below the line (not affecting net sales) as part of the selling costs included in operating expenses.

The accounting for these practices had two significant effects on IMSI's working capital management: (1) a high degree of estimation based on trends of actual experience (subjectivity), and (2) the continual presence in IMSI's invoice

billing and collection cycle of allowances claimed and/or granted in each of the three allowance categories (interruption).

The subjective nature of major working capital accounts and the interruption of normal transaction flow by diverse credits rendered the focus on working capital cash flows mission-critical to successful working capital control. Profit in this environment had increasingly become a matter of subjective assessment whereas cash flow is consistently a matter of fact. Unless and until it could be confident of the accuracy of multiple accounting and control systems affecting reserves, valuation, returns, cutoff, accruals and open purchase orders, IMSI could not assume that cash flow was a calculated number of secondary importance. Monitoring the current ratio, in much the same manner as their banks, IMSI management may have even erroneously assumed that the negative cash flow was growth capital solely attributable to volume.

In short, the subjective, fluid nature of revenue accounting and balance sheet valuation, coupled with IMSI's vulnerability to large distributors with asymmetric negotiating strength, mandated a focused attempt to forecast and monitor variances in corporate liquidity.

The current ratio was simply not effective for the reasons cited above. Gross measures such as depreciation-adjusted profit were insufficient, because operating cash flow analyses were needed. However, in order to eliminate the "noise" from subjective valuations such as returns, discounts and rebates,

management would have needed to isolate charges to reserves and provisions from pure cash flow changes in working capital accounts.

The cash conversion cycle, however, offered areas of focus, metrics for best-practice benchmarks – in language easily understood by line managers who would need to take actions designed to minimize the days during which liquidity was “trapped” in the channel.

The hidden costs of IMSI’s approach to receivables and inventory management extended into many different areas.

Inventory levels and product flow were subject to wide swings. Product flow in more than one direction often generates additional costs even if returns are capable of being refurbished and resold. Severe fluctuation of inbound and outbound product flow can overwhelm the systems in place to track them, causing risks such as unnoticed short-shipped returns and disputes over freight routes and costs.

The return by customers of product for credit with limited ability on the part of IMSI (a) to ensure the credit takes account of credits previously granted (such as price protection), or (b) to ensure inventory available for price protection has not been overstated, raised the risk of errors in credit processing and consequential under-recovery in cash collections.

IMSI faced the possibility and costs of overlooking a common distributor practice of ordering the same products previously returned for credit (“rolling the stock”).

The cumulative effects of the high fluctuation in product flow would cause corresponding swings in cash flow because of the differing proportions of cash and credits claimed for returns.

The disruption of transaction flows and reporting by (a) claiming credit before returns had been physically processed, or (c) returning product with insufficient documentation, would give rise to higher administrative and accounting costs.

There may have been a natural hesitancy to renegotiate terms of trade with a major account for fear of antagonizing or perhaps losing the customer or at least causing them to hesitate before buying IMSI product. The possibility even existed that customers might renegotiate overall terms that in combination were more restrictive and/or costly for IMSI than prior terms for rebates and cooperative advertising.

But the impact of the status quo customer practices was so significant to IMSI's performance and cash flow, that the viability of IMSI's business model was arguably in question.

Several key questions offered the reasoning behind an imperative to renegotiate. If major customers continued to return IMSI product at any time and without cost:

(1) How could IMSI manage its own cash flow consistently? Any concerted effort to improve collections that succeeded in the short term could cause the same customers to later return product in quantities so large that their

accounts would be credited with hundreds of thousands of dollars - but accompanied by hardly any cash payments. In essence they could, at will, take cash payments to IMSI "right back" in the form of credit for returns.

(2) How could IMSI manage inventory effectively? If there was not even a time limit on returns, vendor and customer objectives were in conflict. IMSI relied heavily on the soonest possible date for returns, not just for condition and obsolescence reasons, but a return rate in excess of 10% should be an integral element of inventory forecasting to avoid overproduction. The customer on the other hand had no incentive to be prompt and arguably had a cost incentive to delay returns as late as possible to avoid disruptive product flow, to avoid freight on returns, and to be eligible for price protection.

There was therefore a compelling interest for IMSI to negotiate a more balanced customer relationship. At the very least IMSI should have been motivated to establish (1) standards for return deadlines for product, (2) routing and packing instructions, (3) the level of credits that can be applied to open balances, and (4) the basis for and frequency of exchanging ledger balance detail and reconciliation documents.

To the extent that their existing distributor access to retail channels was too critical and resulted in no change to the buyer's release policy, IMSI would face two fundamentally different challenges: (1) shifting working capital management from a dual receivables and inventory focus to an aggressive inventory management focus, assuming that accurate, reconciled receivables

could be maintained. If inventory could be held for extended periods of time and returned, IMSI would have to develop the discipline and the systems to manage product as if operating on a consignment basis; (2) ensuring that market share, product pricing and margins were sufficient to provide shareholder value despite a longer cash conversion cycle and a correspondingly higher carrying cost.

To examine the required profitability at different levels of working capital in this type of environment, a discounted cash flow matrix could be computed to determine the EBIT margins required to maintain an equivalent rate of return for shareholders under different receivables-inventory holding periods. The required margins would be approximations of an economic (as opposed to cash) break-even point. Stated another way, the matrix could demonstrate how much harder IMSI would have to work on margin improvement to maintain value as the holding period increased. This matrix was considered to be beyond the scope of the author's study although the construction of such a tool is possible.

The analysis thus far had focused on financial and operating aspects of the working capital problem. The implications for IMSI from a strategic perspective can be simplified into a fundamental objective, namely a dual focus on the quantity and the quality of earnings growth.

In order for IMSI to attain the critical mass needed for sustaining a dominant niche position in its chosen segments, growth was not merely discretionary. It was a fundamental requirement. However, in order to translate

the growth into incremental shareholder value, earnings quality would have to improve.

This goal necessarily implied that the Company would need to manage working capital proactively. A lean working capital base would remove unnecessary financial impediments to growth and minimize obsolescence as the time frame for product releases and version updates continued to shorten. Optimal levels of working capital would also offer IMSI the greatest possible flexibility to adjust to the rapidly changing consumer software market.

The author reviewed the five-year trend of IMSI in depth in order to test the strategic potential of the cash conversion cycle. Of particular interest was the temporary improvement in IMSI's liquidity ratios in 1997.

Excluding the 1997 year, the cash conversion cycle indicated a consistent deterioration in IMSI's working capital cash flows over the period under review. Although no management team enjoys the benefit and clarity of hindsight, the author examined subsequent events in an effort to determine whether retroactive adjustments to the period under review would change the signaling effect of the cash conversion cycle, or of equal importance for the central problem under review, the current ratio.

During fiscal years 1999 and 2000, IMSI lost market share as a result of what appeared to be the result of unsuccessful channel arrangements. Distributors removed IMSI one further step away from their customers and were motivated by factors not necessarily congruent with IMSI's quest for greater

market share. In some cases, the distributors thrived on and even fostered price competition between software publishers vying for shelf space. Distributors entered into shelf space arrangements with retailers that provided the distributor with options to order or return product in circumstances that were often opposed to the interests of IMSI.

As a result of these and other factors, IMSI was confronted with massive returns, declining sell-through, and higher cooperative marketing costs that propelled the Company into large financial losses in each of the subsequent years.

In order to perform the "what-if" reconstruction of subsequent events, the writer studied the management discussion and narrative portions of the Company's SEC filings. Of specific relevance was the following excerpt from the fiscal 1999 form 10-K filing:

Information available in regards to channel inventory and sell through activity is limited. This information, generated by third parties from whom IMSI purchases the data, does not cover all of our customers and is unaudited.

Accordingly, management is required to exercise judgment in estimating future returns, price discounts and rebates. These reserves in total were 50%, 20%, and 19% of gross receivables at June 30, 1999, 1998 and 1997, respectively.

The core observation from this excerpt, consistent with the failure of IMSI's channel strategy, is the significant increase in channel provisions from approximately 20% to 50% of receivables by 1999.

Under the assumption of perfect information, the author made the following adjusting entries to the 1997 and 1998 financial statements: (a) to reverse the sales that would be equivalent to an incremental 30% of receivables, the author reduced receivables and sales in each year by the same amount; (b) to restore the inventory to reflect the returns in (a), the author increased inventory and decreased the cost of sales in each year at the average cost of goods' percentage (62%) multiplied by the sales prices in (a).

Having completed the pro forma adjustments, the author recomputed the cash conversion cycle as shown in Table 10.

TABLE 10

IMSI - Reported vs. Pro forma CCC (Cash Conversion Cycle) 1994-1998

	1994	1995	1996	1997	1998
Reported CCC	46	73	122	96	136
Pro forma CCC	46	73	122	137	171

These adjustments indicated a consistent declining cash conversion cycle from 1994 through 1998. At a minimum, under the assumption of perfect information, restatement of the financial statements to reflect the above entries validates the robustness of the cash conversion cycle. Of equal importance, the author observed that because the current ratio is balance sheet-driven, the reallocations between inventory and receivables had no impact on the current ratio at all.

Relaxing the perfect information assumption, the author considered what, if anything, the management team might have learned about IMSI's liquidity risks using only the information and ratios available to them in 1997.

It is plausible that the fundamental nature of the channel strategy shift one year earlier would have at least raised the question of impact on liquidity. It was intuitively evident that introducing another intermediary into the channel would, *ceteris paribus*, extend the number of days that funds would be tied up in working capital. If so, this could conceivably have led to an inquiry as to why the cash conversion cycle had instead improved since 1996.

Simple modeling of "what-if" scenarios along the lines of the above adjustments would have highlighted the sensitivity of IMSI's business model to sell-through in the channel and by implication the risk of returns.

It is too speculative to conclude that with this information IMSI would have taken different corrective and tactical actions but it is plausible that they would at a minimum have had the choice of considering the risks and rewards of alternative actions. However, at the time, IMSI, the Company's bankers and the analysts were focused on the current ratio and no warning sign was apparent from this tool.

## CHAPTER FIVE

### Summary, Conclusions and Recommendations

#### Summary

The objective of this research was to clarify whether the cash conversion cycle is more effective than the current ratio. Clearly, two case studies are not statistically sufficient to extend the applicability of the results to companies in general.

#### Conclusions

This research may nevertheless be relevant to the rapidly changing business environment for three reasons.

First, the case studies presented in this research have presented further descriptive information that negates the general proposition, asserted in financial management literature and evidenced by the its widespread use, that the current ratio is an accurate and consistent financial analysis and liquidity tool. The author's literature review yielded only one other company, Martin Marietta Corporation whose individually reported results generated actual cash flows in a trend that was consistent with the cash conversion cycle analysis but that directly

conflicted with the corresponding current ratio trends over the same period. The researcher identified, by expanding upon the prior analysis of Dell Computer Corporation, another company with the same pattern of conflicting results.

Second, the writer has documented an instance where the cash conversion cycle of a company, AAD, exhibited better predictive capability in a trend that improved one year earlier (1994) than the current ratio (1995).

Third, the author has demonstrated in both the IMSI and AAD case studies, how a relatively straightforward analysis of each company's cash conversion cycle prompted inquiry that ultimately offered insight into strategic shifts in company competitive strategy and industry positioning.

The writer is mindful, however, of Graziano's (1997) caution:

Low-constraint research can negate a general proposition, but can it establish one? The answer is no.

The results reported in this study highlight the potential for more extensive research in this area. Expanded analysis and experimentation may validate this study's results and confirm the cash conversion cycle's broader application.

The study analyzed historical data extending over several years for the two companies in question. It is conceivable that extending any application of the cash conversion cycle and the current ratio to other companies or other time frames may produce results that either validate or conflict with the findings in this study.

Of particular importance, the author, as a consequence of the findings in the two case studies, has concluded that the cash conversion cycle has the potential to significantly improve a firm's strategic diagnostic and predictive capabilities.

Other areas for further research not specifically addressed by this study are the information needs of management during periods of financial decline. Of interest to the findings in this study, Fredenberger (1991) conducted empirical research by using a survey questionnaire that solicited the needs of turnaround managers. A major finding was that not all the financial analysis considered necessary by the respondent managers was available as needed. One plausible hypothesis would be that many of the managers had access to current and quick financial ratios but not the cash conversion cycle, given the popularity of the former and the relative obscurity of the latter.

### Recommendations

The study additionally highlights areas of potential future research for refining the cash conversion cycle computation in order to increase its accuracy and to broaden its application to other areas of financial management. Specifically, it appears to be possible to make adjustments to the formula to eliminate seasonality distortions.

The formula may be further adjusted by weighting the components relative to their working capital dollar impact. Gentry, Vaidyanathan, and Lee in 1990 explored this approach in some depth. They focused on the following key deficiency in the cash conversion cycle:

The cash conversion cycle focuses only on the length of time funds are tied up in the cycle and does not take into consideration the amount of funds committed to a product as it moves through the operating cycle.

A further area of improvement is the potential to standardize the cash conversion cycle in order to use the calculation as an estimator of future working capital cash investment required, or stated in its simplest terms, how to convert the days to working capital dollar equivalents.

The researcher examined the extent to which additional refinements to the cash conversion cycle may require levels of detail only available to corporate management, effectively narrowing its use to those with access to more detailed internal data.

The author also explored the literature for cash conversion cycle methods that address some of the deficiencies noted earlier, while still in a format that lends itself to ease of use. Given the popularity of the current ratio for that same reason, the researcher suggests that the cash conversion cycle as defined in this study presents a replacement ratio for external users of financial statements, with similar characteristics that do not impinge on the integrity of a more detailed, seasonally adjusted version that would be useful for corporate management teams with access to the more detailed transaction data.

A further avenue for research is a similar comparison of the effectiveness of the cash conversion cycle and cash flow statements. Dechow (1993) explored the relationship between earnings and cash flows in performance analysis, demonstrating in part that the length of a company's operating cycle, was a significant factor in the negative correlation between performance and cash flows. Accrual-based earnings also exhibited negative correlation, but to a lesser degree.

In conclusion, the author has examined the theoretical and empirical research covering liquidity analysis and the evaluation of working capital cash flows. Utilizing the findings of this research as the framework for testing the effectiveness of the cash conversion cycle, the author analyzed two companies in depth, concluding that the findings supported the hypothesis that the cash conversion cycle is more effective than the current ratio in evaluating working capital cash flows. The case studies demonstrated that the cash conversion cycle demonstrated better accuracy, consistency and predictive attributes.

These findings have several implications: (1) the results of this research have added to the body of knowledge that supports the adoption of the cash conversion cycle as a more preferable liquidity analysis technique than the current ratio; (2) the case findings lend further credence to concerns that the current ratio can produce erroneous results that conflict with the underlying liquidity trend of a company; and (3) the dynamic nature of the cash conversion

cycle may offer strategic insights into corporate strategy when used as a planning and evaluation tool.

The results of this research offer avenues for improving the practice of liquidity management through the wider use of the cash conversion cycle, improvements to the existing calculation and through the impetus for additional research in related areas of working capital cash flow analysis.

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## APPENDICES

APPENDIX A

Research Consent Form

Mr. John Lachenicht, CFO  
Associated Automotive Distributors (Pty) Ltd.

By fax

Dear Mr. Lachenicht

I am currently engaged in research that attempts to compare the effectiveness of the current ratio with the cash conversion cycle in evaluating working capital cash flows.

In 1996 your company provided me with financial statement summaries for the five years ending April 1996 and background corporate information in preparation for strategy and valuation consultation that I rendered to AAD later that year.

Although this data is now five years old, it offers useful information for this research topic.

As discussed previously, I am seeking AAD's consent to utilize extracts from this information as part of a case study for my doctoral dissertation. I believe such information would make a valuable contribution to the body of research on the subject of liquidity analysis.

Thank you for your cooperation and consent.

Please sign below in the indicated area.

Kind regards

Costa John

---

AAD (Associated Automotive Distributors (Pty) Ltd.) hereby consents to the use of the above referenced information for the purposes of Costa John's doctoral research.

For AAD

John Lachenicht  
Chief Financial Officer

Johannesburg, South Africa  
**7 December, 2001**

APPENDIX B

IMSI SEC Annual Financial Statements

## IMSI FINANCIALS 1996

ASSETS	1996 ----	1995 ----
Current assets:		
Cash and cash equivalents	\$ 387,406	\$ 523,235
Receivables, less allowances for doubtful accounts and returns of \$1,301,509 and \$777,718	4,121,210	2,590,322
Inventories, net	2,538,093	1,625,631
Prepaid royalties and licenses	746,677	336,053
Deferred direct mail costs	217,513	358,398
Deferred tax assets, net	791,301	321,362
Other current assets	262,108	182,637
Total current assets	9,064,308	5,937,638
Furniture and equipment, net	1,101,306	836,610
Deferred tax assets, net	344,067	411,721
Capitalized software development costs, net	272,102	244,839
Intangibles and other assets, net	276,595	39,583
Total assets	\$11,058,378 =====	\$7,470,391 =====
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Credit line payable	\$ --	\$ 400,000
Accounts payable and accrued expenses	4,395,461	3,139,059
Income taxes payable	1,011,118	245,008
Current portion of notes payable	333,778	--
Current portion of capital lease obligations	231,641	186,529
Total current liabilities	5,971,998	3,970,596
Capital lease and other long-term obligations	283,321	102,570
Notes payable	281,250	--
Total liabilities	6,536,569 -----	4,073,166 -----

## Commitments and contingencies

## Shareholders' equity:

Preferred stock, no par value; 20,000,000 shares authorized; none issued or outstanding	--	--
Common stock, no par value; 300,000,000 shares authorized; Issued and outstanding - 3,223,125 and 3,173,304 shares, respectively	5,972,850	5,863,776
Accumulated deficit	(1,223,797)	(2,177,369)
Cumulative translation adjustment	66,214	(23,724)
Notes receivable from shareholders	(293,458)	(265,458)
	-----	-----
Total shareholders' equity	4,521,809	3,397,225
	-----	-----
Total liabilities and shareholders' equity	\$11,058,378	\$7,470,391
	=====	=====

	1996 ----		1995 ----		1994 ----	
Net revenues	\$25,679,017	100.0%	\$20,300,361	100.0%	\$23,118,193	100.0%
Product costs	8,261,583	32.2%	7,143,795	35.2%	7,745,258	33.5%
Gross margin	<u>17,417,434</u>	<u>67.8%</u>	<u>13,156,566</u>	<u>64.8%</u>	<u>15,372,935</u>	<u>66.5%</u>
Costs and expenses:						
Sales and marketing	9,888,558	38.5%	8,918,867	44.0%	11,039,663	47.8%
General and administrative	2,556,757	10.0%	2,456,990	12.1%	2,627,649	11.4%
Research and development	3,170,937	12.3%	2,151,069	10.6%	1,152,382	5.0%
	<u>15,616,252</u>	<u>60.8%</u>	<u>13,526,926</u>	<u>66.6%</u>	<u>14,819,694</u>	<u>64.1%</u>
Operating income (loss)	1,801,182	7.0%	(370,360)	(1.8)%	553,241	2.4%
Other income (expense), net	<u>(262,374)</u>	<u>(1.0)%</u>	<u>(53,925)</u>	<u>(0.3)%</u>	<u>20,118</u>	<u>0.1%</u>
Income (loss) before taxes and cumulative effect of accounting change	1,538,808	6.0%	(424,285)	(2.1)%	573,359	2.5%
Provision for income taxes	<u>585,236</u>	<u>2.3%</u>	<u>10,548</u>	<u>0.1%</u>	<u>253,169</u>	<u>1.1%</u>
Income (loss) before cumulative effect of accounting change	953,572	3.7%	(434,833)	(2.1)%	320,190	1.4%
Cumulative effect of accounting change	--	--	--	--	800,000	3.5%
Net income (loss)	<u><u>\$953,572</u></u>	<u><u>3.7%</u></u>	<u><u>\$(434,833)</u></u>	<u><u>(2.1)%</u></u>	<u><u>\$1,120,190</u></u>	<u><u>4.8%</u></u>

	1996 ----	1995 ----	1994 ----
Cash flows from operating activities:			
Net income (loss)	\$ 953,572	\$ (434,833)	\$ 1,120,190
Adjustments to reconcile net income (loss) to net cash provided by operating activities:			
Cumulative effect of accounting change	--	--	(800,000)
Depreciation	363,445	351,822	292,925
Amortization	482,035	975,641	362,431
Compensation expense	--	78,642	--
Deferred taxes	(402,285)	(225,721)	260,433
Loss on equipment write-offs	--	37,279	--
Changes in:			
Receivables, net	(1,530,888)	(934,551)	(498,056)
Inventories	(912,462)	(337,863)	(365,754)
Prepaid royalties and licenses	(410,624)	(102,547)	(171,006)
Deferred direct marketing costs	140,885	333,849	187,978
Other current assets	(79,471)	(24,912)	(50,146)
Accounts payable and accrued expenses	1,256,402	262,124	325,935
Income taxes payable/receivable, net	766,110	260,457	(71,068)
Foreign currency translation	89,938	38,166	(14,207)
Net cash provided by operating activities	----- 716,657	----- 277,553	----- 579,655
Cash flows from investing activities:			
Purchases of furniture and equipment	(342,826)	(356,969)	(465,795)
Floor Plan acquisition	(687,500)	--	--
Capitalized software development costs	(58,719)	(191,460)	(992,399)
Other	(90)	(49,910)	22,394
Net cash (used) by investing activities	----- (1,089,135)	----- (598,339)	----- (1,435,800)

Cash flows from financing activities:			
Credit line borrowings	1,525,000	2,245,000	--
Credit line repayments	(1,925,000)	(1,845,000)	(205,000)
Borrowings through term loan and other obligations	768,750	--	--
Repayments on capital lease and other obligations	(241,175)	(118,211)	(51,808)
Other	--	--	1,542
Proceeds from issuance of common stock-net	109,074	40,885	1,443,222
	-----	-----	-----
Net cash provided by financing activities	236,649	322,674	1,187,956
	-----	-----	-----
Net increase (decrease) in cash and cash equivalents	(135,829)	1,888	331,811
Cash and cash equivalents at beginning of period	523,235	521,347	189,536
	-----	-----	-----
Cash and cash equivalents at end of the period	\$ 387,406	\$ 523,235	\$ 521,347
	=====	=====	=====

## IMSI FINANCIALS 1997

	June 30, 1997	June 30, 1996
	-----	-----
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 1,126,042	\$ 387,406
Receivables, less allowances for doubtful accounts and returns of \$2,943,149 and \$1,301,509	7,535,634	4,121,210
Inventories, net	3,472,526	2,538,093
Prepaid royalties and licenses	1,285,221	746,677
Deferred tax assets, net	1,472,513	791,301
Other current assets	477,907	479,621
	-----	-----
Total current assets	15,369,843	9,064,308
Furniture and equipment, net	1,693,514	1,101,306
Deferred tax assets, net	264,712	344,067
Other assets, net	244,505	548,697
	=====	=====
Total assets	\$17,572,574	\$11,058,378
	=====	=====
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Short term debt and other obligations	401,598	231,641
Trade accounts payable	4,500,715	3,076,822
Current portion of notes payable	558,336	333,778
wages, benefits and sales tax payable	515,092	263,728
Contracts payable	1,318,121	1,054,911
Income taxes payable	741,466	1,011,118
	-----	-----
Total current liabilities	8,035,328	5,971,998
Long term debt and other obligations	2,042,124	564,571
	-----	-----
Total liabilities	10,077,452	6,536,569

## Commitments and contingencies

## Shareholders' equity:

Common stock, no par value; 300,000,000 authorized; issued and outstanding 5,128,759 and 4,834,689 shares	6,453,488	5,972,850
Retained earnings (accumulated deficit)	1,372,706	(1,223,797)
Cumulative translation adjustment	(45,614)	66,214
Notes receivable from shareholders	(285,458)	(293,458)
	-----	-----
Total shareholders' equity	7,495,122	4,521,809
	-----	-----
Total liabilities and shareholders' equity	<u>\$17,572,574</u>	<u>\$11,058,378</u>
	=====	=====



	1997	1996	1995
	-----	-----	-----
Cash flows from operating activities:			
Net income (loss)	\$ 2,596,503	\$ 953,572	(\$434,833)
Adjustments to reconcile net income (loss) to net cash provided (used) by operating activities			
Depreciation and amortization	857,938	845,480	1,327,463
Deferred taxes	(601,857)	(402,285)	(225,721)
Other	--	--	115,921
Changes in:			
Receivables, net	(3,414,424)	(1,530,888)	(934,551)
Inventories	(934,433)	(912,462)	(337,863)
Prepaid royalties and licenses	(538,544)	(410,624)	(102,547)
Other current assets	(8,284)	61,414	308,937
Trade accounts payable	1,423,893	879,482	167,760
Wages, benefits and sales tax payable	251,364	75,384	23,591
Contracts payable	263,210	301,536	70,773
Income taxes payable	(269,652)	766,110	260,457
Currency translation adjustment	(111,828)	89,938	38,166
Net cash provided (used) by operating activities	----- (486,114)	----- 716,657	----- 277,553
Cash flows from investing activities:			
Purchase of equipment	(323,869)	(342,826)	(356,969)
Capitalized software development costs	(43,697)	(58,719)	(191,460)
FloorPlan(R) acquisition	--	(687,500)	--
Other	--	(90)	(49,910)
Net cash (used) by investing activities	----- (367,566)	----- (1,089,135)	----- (598,339)

Cash flows from financing activities:			
Credit line borrowings	4,869,000	1,525,000	2,245,000
Credit line repayments	(4,869,000)	(1,925,000)	(1,845,000)
Borrowings through term loan, net	1,476,249	768,750	--
Capital lease and other obligations repayment	(372,571)	(241,175)	(118,211)
Notes receivable from shareholders	8,000	--	--
Proceeds from issuance of common stock	480,638	109,074	40,885
	-----	-----	-----
Net cash provided by financing activities	1,592,316	236,649	322,674
Net increase (decrease) in cash and cash equivalents	738,636	(135,829)	1,888
Cash and cash equivalents at beginning of period	387,406	523,235	521,347
	-----	-----	-----
Cash and cash equivalents at end of the period	<u>\$ 1,126,042</u>	<u>\$ 387,406</u>	<u>\$ 523,235</u>
	=====	=====	=====

## IMSI FINANCIALS 1998

	1998	1997
	-----	-----
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 2,093	\$ 1,126
Receivables, less allowances for doubtful accounts and returns of \$4,231 and \$2,943	13,149	7,536
Inventories, net	6,549	3,473
Prepaid royalties and licenses	2,517	1,285
Deferred tax assets, net	1,762	1,472
Other current assets	759	478
	-----	-----
Total current assets	26,829	15,370
Furniture and equipment, net	3,430	1,693
Deferred tax assets, net	2,676	265
Capitalized software development costs, net	2,101	92
Other assets, net	314	153
	-----	-----
Total assets	\$ 35,350	\$ 17,573
	=====	=====
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Credit line payable	7,948	--
Short term debt and other obligations	842	402
Trade accounts payable	6,915	4,501
Current portion of notes payable	1,434	558
wages, benefits and sales tax payable	932	515
Contracts payable	1,621	1,318
Income taxes payable	313	742
	-----	-----
Total current liabilities	20,005	8,036

Long term debt and other obligations	1,682	2,042
	-----	-----
Total liabilities	21,687	10,078
Commitments and contingencies		
Shareholders' equity:		
Common stock, no par value; 300,000,000 authorized; issued and outstanding 5,684,179 and 5,128,759 shares	12,718	6,453
Retained earnings	1,255	1,373
Cumulative translation adjustment	(25)	(46)
Notes receivable from shareholders	(285)	(285)
	-----	-----
Total shareholders' equity	13,663	7,495
	-----	-----
Total liabilities and shareholders' equity	\$ 35,350	\$ 17,573
	=====	=====

	1998	1997	1996
	-----	-----	-----
Net revenues	\$ 62,472	\$ 41,839	\$ 25,679
Product costs	23,382	16,893	8,262
	-----	-----	-----
Gross margin	39,090	24,946	17,417
	-----	-----	-----
Costs and expenses:			
Sales and marketing	18,611	12,026	9,888
General and administrative	5,005	3,988	2,557
Research and development	8,614	4,565	3,171
Write off purchased in process research and development	6,367	--	--
	-----	-----	-----
Total operating expenses	38,597	20,579	15,616
	-----	-----	-----
Operating income	493	4,367	1,801
Interest and other expense, net	759	130	262
	-----	-----	-----
Income (loss) before income taxes	(266)	4,237	1,539
Income tax provision (benefit)	(148)	1,640	585
	-----	-----	-----
Net income (loss)	\$ (118)	\$ 2,597	\$ 954
	=====	=====	=====

	1998	1997	1996
	-----	-----	-----
Cash flows from operating activities:			
Net income (loss)	(\$ 118)	\$ 2,597	\$ 954
Adjustments to reconcile net income (loss) to net cash provided (used) by operating activities			
Depreciation and amortization	4,147	2,098	934
Amortization of deferred compensation	402	--	--
Deferred taxes	(2,700)	(602)	(402)
write-off of prepaid royalties	84	160	--
write-off of purchased in-process research and development	6,367	--	--
Changes in:			
Receivables, net	(5,443)	(3,414)	(1,531)
Inventories	(3,061)	(934)	(912)
Prepaid royalties and licenses	(3,361)	(1,939)	(499)
Other current assets	(281)	(8)	61
Trade accounts payable	1,942	1,424	879
wages, benefits and sales tax payable	416	251	75
Contracts payable	303	263	302
Income taxes payable	(429)	(270)	766
Currency translation adjustment	22	(112)	90
Net cash provided (used) by operating activities	----- (1,710)	----- (486)	----- 717
Cash flows from investing activities:			
Purchase of equipment	(1,026)	(323)	(343)
Cash paid for acquisitions of software development costs and in-process technologies	(2,708)	(44)	(746)
Other	(170)	--	--
Net cash (used) by investing activities	----- (3,904)	----- (367)	----- (1,089)

Cash flows from financing activities:			
Credit line borrowings	16,358	4,869	1,525
Credit line repayments	(8,410)	(4,869)	(1,925)
Term loan borrowings	1,500	2,000	946
Term loan repayments	(2,782)	(524)	(178)
Capital lease and other obligations repayment	(611)	(373)	(241)
Notes receivable from shareholders	--	8	--
Proceeds from issuance of common stock	526	481	109
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Net cash provided by financing activities	6,581	1,592	236
Net increase (decrease) in cash and cash equivalents	967	739	(136)
Cash and cash equivalents at beginning of year	1,126	387	523
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Cash and cash equivalents at end of the year	\$ 2,093	\$ 1,126	\$ 387
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