

## **THE STUDY OF RELATIONSHIP BETWEEN PERFORMANCE METRICS AND CASH CONVERSION CYCLE OF COMPANIES LISTED IN TEHRAN STOCK EXCHANGE**

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### **Abstract**

*Businesses continue to operate its short-term resource management depends to a great extent, the normal operating activities in a period usually a year to identify its optimal working capital management is concerned. So that it becomes possible to achieve the expected results will provide long-term continuity of operations. In connection with the financing of working capital management decisions and controlling current assets of the business units, given the importance of the study mentioned above, due to the restrictions imposed on listed companies in the period 2005 to 2011, 73 companies were chosen to investigate the hypothesis. Present results in the form of hypotheses of working capital management(Cash conversion cycle companies) Assessment of the indicators of corporate profitability has Suggest that the relationship between cash conversion cycle and its components, including the collection period, inventory turnover and payment of creditors With indicators of economic value added, compared with earnings per share and operating cash flow is a meaningful relationship And corporate executives can reduce the collection period and inventory turnover period, sufficient to increase their profitability. Also, the results in relation to the payment of creditors in accordance with the view that the payment of creditors, the companies that have high profitability are less profitable than companies that are shorter than.*

**Keywords:** *Working Capital - Cash Conversion Cycle - Financial Evaluation Criteria*

### **INTRODUCTION**

It has become a commonplace to say that it is important to monitor and assess performance, whether of firms or countries or individuals. This is especially the case as our societies have become more performance-oriented (Stiglitz et al, 2008).

Performance measurement is a fundamental building block of TQM and a total quality organization. Historically, organizations have always measured performance in some way through the financial performance, be this success by profit or failure through liquidation.

A performance metric is a measure of an organization's activities and performance. Performance metrics should support a range of stakeholder needs from customers, shareholders to employees. While traditionally many metrics are financial based, inwardly focusing on the performance of the organization, metrics may also focus on the performance against customer requirements and value. In project management, performance metrics are used to assess the health of the project and consist of the measuring of seven criteria: safety, time, cost, resources, scope, quality, and actions (Turbit, 2008). Performance Measures should identify the population to be measured, the method of the measurement, and the data source and time period for the measurement. Developing performance metrics usually follows a process of:

1. Establishing critical processes/customer requirements
2. Identifying specific, quantifiable outputs of work
3. Establishing targets against which results can be scored

The balanced scorecard integrates four sets of measurements, complementing traditional financial measures with those driving future performance. An organization using this framework is encouraged to develop metrics that facilitate collection and analysis of information from the following perspectives: (Rahnema Rodposhti and Kiyani, 2007).

- Financial
- Customer
- Learning and Growth
- Internal Business Processes

Implementation of a balanced scorecard presents an opportunity for a Performing Organization to look at its existing programs, services, and processes. Are the right services being provided to the Customers? (Are we doing the right things?) Are the processes implemented now the most efficient and cost effective that they can be? (Are we doing things right?).

Specific measures (metrics) are developed which can then be analyzed to provide answers to these questions.

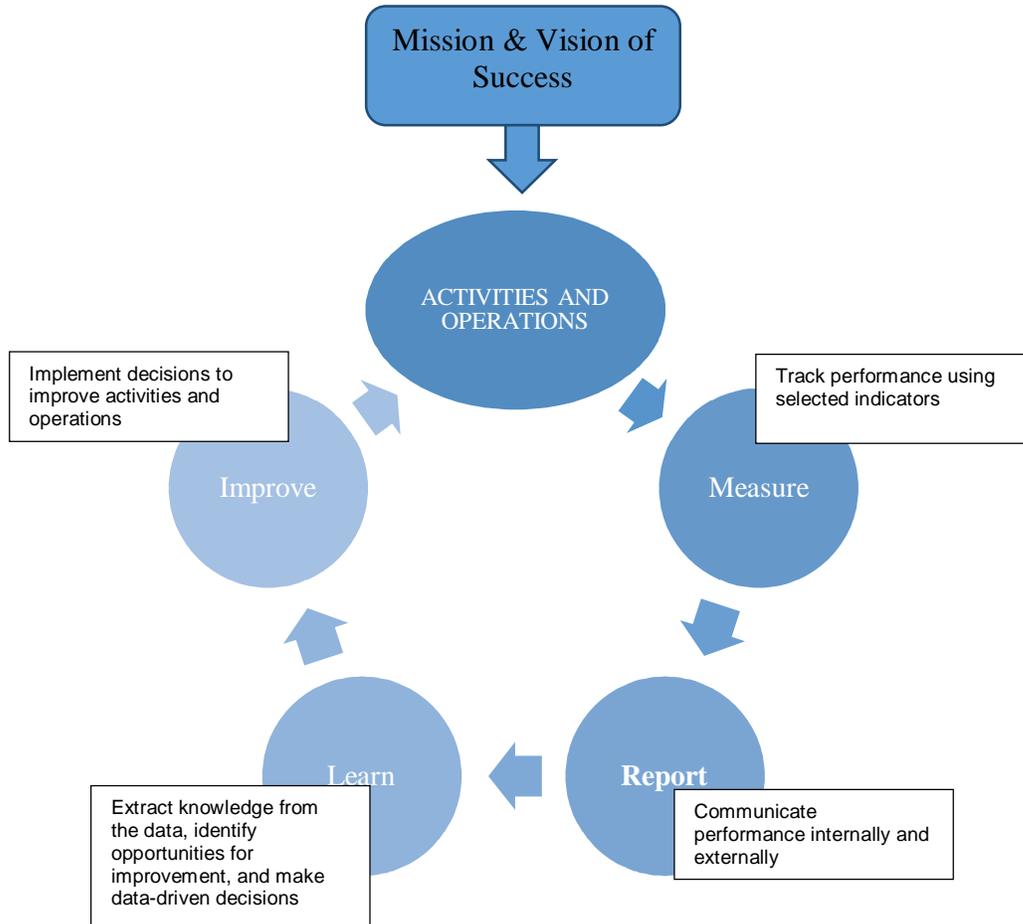
Once appropriate metrics have been identified, data collection and tracking processes are put in place, the organization can begin to adjust its practices and evaluate its performance over time. A continuous feedback loop is formed, in which the organization can use measurement information to re-align initiatives as needed.

Scorecards are effective in aligning an organization's business areas and activities with its overall strategy, identifying critical financial and non-financial measures, identifying cause-and-effect relationships among measures that may aid in problem diagnosis and encourage accountability across the organization (Rahnema Rodposhti and Kiyani, 2007).

Performance measurement serves a similar purpose when applied to advancing social innovation to address social problems. It helps identify opportunities for improvement in an organization's approach to achieving social impact, and it can inform day-to-day and longer-term decision making (Wolk et al, 2009).

As illustrated in Figure 1, a performance measurement system constitutes a cycle that includes four major phases of activity. In what follows, we discuss each phase and introduce several key components of a performance measurement system.

Figure 1. The Performance Measurement Cycle



*Mission and vision of success:* The mission articulates an organization’s purpose, and a vision of success describes how the world will be different if the organization succeeds in carrying out its mission. The mission and vision of success work together to guide an organization’s activities and operations.

*Activities and operations:* Activities are any programs, services, and initiatives run by an organization. Operations are the organizational infrastructure that supports these activities, including human resources, technology, and financial management. Together, activities and operations constitute everything an organization does to carry out its mission and realize its vision of success. Mission & Vision of Success ACTIVITIES AND OPERATIONS improve measure learn report Implement decisions to improve activities and operations Extract knowledge from the data, identify opportunities for improvement, and make data-driven

decisions Communicate performance internally and externally Track performance using selected indicators

The performance measurement cycle starts and ends with an organization's activities and operations, as it continually moves through the following phases:

*Measure:* Organizations operating performance measurement systems use indicators, metrics that are tracked regularly, to assess their activities and supporting operations.

*Report:* To compile performance measurement data into a format that is easy to analyze, organizations can use two main types of reporting tools:

1. A *dashboard* includes a focused selection of indicators to provide periodic snapshots of the organization's overall progress in relation to past results and future goals. All performance measurement systems should include a *management dashboard*, which enables an organization's leadership team to track overall organizational performance. Many organizations also choose to create *program-level dashboards* to track individual programs or internal areas, such as marketing or human resources, at a more detailed level.
2. A *report card* contains highlights from an organization's internal dashboards and facilitates sharing data externally with social impact investors and other stakeholders. This external reporting tool helps to establish accountability with social impact investors.

*Learn:* Using the reporting tools listed above, an organization's leadership and other key staff members review and interpret performance data in order to make well-informed decisions and identify opportunities for improvement and necessary course corrections.

*Improve:* The organization implements its decisions to improve its activities and operations. From there, the performance measurement cycle begins again (Wolk et al, 2009).

The cash-conversion-cycle (CCC) metric is an important financial metric as it expresses operational performance in financial terms and can be derived from information readily available in published financial statements. The concept of CCC leads to the premise that a reduction in the cash conversion cycle time will lead to financial and operational improvement; however the CCC concept assumes that shortening of cycle time can be achieved without increasing costs or decreasing sales (Soenen, 1993). This assumption has limitations as reducing the terms of credit for receivers would lead to a reduction of the product's attractiveness from a customer's perspective and lead to a reduction in sales volume and revenue; similarly delaying payment to suppliers will not be well received and is likely to lead to an increase in the cost of goods supplied.

The CCC, or cash conversion cycle, is a composite metric that is considered as a key metric that can drive supply chain performance improvement (Steward, 1995). However, definitions of CCC are not harmonized even though the concept is relatively well understood. Table 1 illustrate existing definitions of CCC.

Table 1: Definitions of cash to cash

Source	Definition
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Stewart (1995)	A composite metric describing the average days required to turn a dollar invested in raw material into a dollar collected from a customer
Moss and Stine (1993)	Days between accounts payable and <i>accounts</i> receivable
Gallinger (1997)	The cash conversion cycle measures the number of days the firm's operating cycle requires costly financing to support it.
Lancaster et al. (1998) Schilling (1996) Soenen (1993)	Inventory days of supply + accounts receivable – accounts payable

Although the operating cycle, the cash conversion cycle, the weighted cash conversion cycle, and the net trade cycle are powerful measures of working capital management and firm's liquidity comparing with the static traditional ratios such as the current ratio and the quick ratio that are inadequate and misleading in the evaluation of firm's liquidity, these cycles does not considers the optimal levels of receivables, inventories, and payables (Nobanee, 2008).

CCC is an important analysis tool that allows the credit analyst to determine more easily why and when the businesses need more cash to operate, and when and how businesses will be able to repay the cash. CCC is also used to distinguish between the customer's stated loan purpose and the borrowing cause. Once the cash conversion cycle for the borrower is mapped, the analyst is then able to judge whether the purpose, repayment source and structure of the loan are the adequate ones. Managing effective cash conversion cycle in favor of the business owner is one of the objectives of supply chain management and techniques such as just in time inventory. The cash conversion cycle represents the number of days it takes a company to purchase raw materials, convert them into finished goods, sell the finished product to a customer and receives payment from the customer/account debtor for the product. The CCC has three components: Account Receivable Turnover Days; Inventory Turnover Days; and Account Payable Turnover Days. At its simplest expression the CCC of a company is defined by the sum of the Account Receivable Turnover Days and the Inventory Turnover Days minus the Account Payables Turnover Days.

$$CCC = A/R + Inv - A/P$$

The CCC can be calculated using the following component:

1. *Account Receivable Turnover in Days*. Measures the average number of days from the sale of goods to collection of resulting receivables. It is obtained by the following formula:  $(\text{Account Receivable}/\text{Sales}) * 365$
2. *Inventory Turnover*. Measures the length of time on average between the acquisition and sale of merchandise. It is obtained by the following formula:  $(\text{Inventory}/\text{COGS}) * 365$
3. *Payable Turnover in Days*. Measures the average length of time between purchase of goods and payment for them. It is obtained by the following formula:  $(\text{Accounts Payable}/\text{COGS}) * 365$

The main objective of this paper is to explore the Performance metrics that Cash Conversion Cycle relationship in Tehran Stock Exchange.

## **METHODOLOGY**

Since in the present research the relationship between three indices of Performance metrics and Cash Conversion Cycle is studied, research method is descriptive – correlative. Correlative research is used for two purposes: Study of correlation between two or few variables, and predicting one variable based on another.

The population of the study was all company that listed during the 2007 till 2012 in Tehran Stock Exchange. Statistical sample was selected by following conditions:

- The company's financial information be available during the study.
- The company was not losing during the period of study.
- The company end of the financial year was in (ESFAND) March.
- The company was not like banks and financial institutions (investment companies, financial intermediation, holding and leasing companies)
- The company was listing in Tehran Stock Exchange until end of 2012.
- During the study period, they were not disabled more than four months in the stock market.

According to above conditions sample was 72 company. Data was gathered by Rahavard Novin Software, Tehran Stock Exchange databases, Companies Financial Statements, Memorandums accompanying the listed companies and Transaction information.

We used Kolmogorov-Smirnov Test to understanding the Normality of test distribution. It shows that with significant levels of 0.000 initial data error 0.05,  $H_0$  hypothesis is rejected. The data distribution is not normal.

Table 1 - the result of Kolmogorov-Smirnov Test

	EVA	REVA	Q TOBIN	P/E	EPS	CFO	CCC
N	455	455	504	504	502	504	497
Mean	391350.89	-45429.9	6.1302	7.8397	865.9147	330173.50	611.9074
Std. Deviation	1150167.4	561182.02	123.11231	24.89894	939.96047	1060751.8	39086.708
Absolute	.330	.349	.411	.380	.121	.341	.476
Positive	.321	.298	.411	.380	.121	.341	.476
Negative	-.330	-.349	-.386	-.363	-.113	-.322	-.425
Kolmogorov-Smirnov Z	7.049	7.439	9.228	8.529	2.701	7.645	10.604
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000

To examine relation between independent variables and dependent variables in all hypothesis, Spearman correlation coefficient were used.

## **RESULTS**

In this paper we have six main hypotheses. The statistical way of analysis of hypotheses is two ways,  $H_1$  is acceptance of hypothesis and  $H_0$  is rejecting of hypothesis. In other words, it means that  $H_1$  has positive meaning and  $H_0$  has negative meaning.

***H1a-There is relationship between Economic Value Added (EVA) and Cash Conversion Cycle in Tehran Stock Exchange listed company.***

Correlation analysis has been done in order to determine the relationship between relationship Economic Value Added as independent variables and Cash Conversion Cycle as dependent variable. The correlation analysis result between these variables is shown in table 1.

Table 3: Results of Correlation coefficient of Hypothesis 1a.

	n	R	P-value	Result
2005	73	- .500	.000	Confirm $H_1$
2006	73	- .277	.024	Confirm $H_1$
2007	73	- .296	.017	Confirm $H_1$
2008	73	- .302	.003	Confirm $H_1$
2009	73	- .374	.002	Confirm $H_1$
2010	73	- .359	.003	Confirm $H_1$
2011	73	- .288	.014	Confirm $H_1$
Total	438	- .336	.000	Confirm $H_1$

According to table 5, the significant p value is less than 0.05, with 99% confidence, we can confirm  $H_1$  and reject  $H_0$ . The strongest negative relationship between variables occur in 2005 and the lowest negative relationship between variables occur in 2006. So we can say that there is negative relationship between Economic Value Added (EVA) and Cash Conversion Cycle in Tehran Stock Exchange listed company.

***H1b- There is relationship between Adjusted Economic Value Added (AEVA) and Cash Conversion Cycle in Tehran Stock Exchange listed company.***

Correlation analysis has been done in order to determine the relationship between relationship Adjusted Economic Value Added as independent variables and Cash Conversion Cycle as dependent variable. The correlation analysis result between these variables is shown in table 1.

Table 3: Results of Correlation coefficient of Hypothesis 1a.

	n	R	P-value	Result
2005	73	- .217	.217	Confirm $H_0$
2006	73	- .197	.114	Confirm $H_0$
2007	73	- .216	.086	Confirm $H_0$
2008	73	- .121	.393	Confirm $H_0$
2009	73	.117	.357	Confirm $H_0$
2010	73	.081	.520	Confirm $H_0$
2011	73	.073	.511	Confirm $H_0$
Total	438	- .085	.071	Confirm $H_0$

According to table 5, the significant p value is bigger than 0.05, with 99% confidence, we can confirm  $H_0$  and reject  $H_1$ . The weakness relationship between variables occur in 2011 and the highest negative relationship between variables occur in 2005. So we can say that there is not any relationship between Adjusted Economic Value Added (AEVA) and Cash Conversion Cycle in Tehran Stock Exchange listed company.

***H2a-There is relationship between Q Tobin ratio and Cash Conversion Cycle in Tehran Stock Exchange listed company.***

Correlation analysis has been done in order to determine the relationship between relationship Q Tobin ratio as independent variables and Cash Conversion Cycle as dependent variable. The correlation analysis result between these variables is shown in table 1.

Table 3: Results of Correlation coefficient of Hypothesis 1a.

	n	R	P-value	Result
2005	73	.007	.951	Confirm $H_0$
2006	73	- .051	.672	Confirm $H_0$
2007	73	.308	.009	Confirm $H_1$
2008	73	.277	.020	Confirm $H_1$
2009	73	.111	.359	Confirm $H_0$
2010	73	.043	.724	Confirm $H_0$
2011	73	.012	.921	Confirm $H_0$
Total	438	- .074	.071	Confirm $H_0$

According to table 5, the significant p value is bigger than 0.05, with 99% confidence, we can confirm  $H_0$  and reject  $H_1$ . But in 2007 and 2008 p value is less than 0.05 and we confirm  $H_1$ . The weakness relationship between variables occur in 2011 and the highest positive relationship between variables occur in 2007. So we can say that there is not any relationship between Q Tobin ratio and Cash Conversion Cycle in Tehran Stock Exchange listed company.

***H2b- There is relationship between the ratio of stock prices to earnings and Cash Conversion Cycle in Tehran Stock Exchange listed company.***

Correlation analysis has been done in order to determine the relationship between relationship ratio of stock prices to earnings as independent variables and Cash Conversion Cycle as dependent variable. The correlation analysis result between these variables is shown in table 1.

Table 3: Results of Correlation coefficient of Hypothesis 1a.

	n	R	P-value	Result
2005	73	-.248	.037	Confirm $H_1$
2006	73	- .14	.216	Confirm $H_0$
2007	73	.047	.697	Confirm $H_0$
2008	73	.185	.123	Confirm $H_0$
2009	73	.041	.738	Confirm $H_0$

2010	73	.203	.090	Confirm H <sub>0</sub>
2011	73	-.071	.551	Confirm H <sub>0</sub>
Total	438	-.012	.786	Confirm H <sub>0</sub>

According to table 5, the significant p value is bigger than 0.05, with 99% confidence, we can confirm H<sub>0</sub> and reject H<sub>1</sub>. But in 2005 p value is less than 0.05 and we confirm H<sub>1</sub>. The weakness relationship between variables occur in 2007 and the highest negative relationship between variables occur in 2005. So we can say that there is not any relationship between ratio of stock prices to earnings and Cash Conversion Cycle in Tehran Stock Exchange listed company.

***H3a-There is relationship between the ratio of earnings per share and Cash Conversion Cycle in Tehran Stock Exchange listed company.***

Correlation analysis has been done in order to determine the relationship between relationship ratio of earnings per share as independent variables and Cash Conversion Cycle as dependent variable. The correlation analysis result between these variables is shown in table 1.

Table 3: Results of Correlation coefficient of Hypothesis 1a.

	n	R	P-value	Result
2005	73	-.165	.167	Confirm H <sub>0</sub>
2006	73	-.306	.009	Confirm H <sub>1</sub>
2007	73	-.026	.826	Confirm H <sub>0</sub>
2008	73	.113	.350	Confirm H <sub>0</sub>
2009	73	-.106	.379	Confirm H <sub>0</sub>
2010	73	-.087	.469	Confirm H <sub>0</sub>
2011	73	-.169	.160	Confirm H <sub>0</sub>
Total	438	-.179	.095	Confirm H <sub>0</sub>

According to table 5, the significant p value is bigger than 0.05, with 99% confidence, we can confirm H<sub>0</sub> and reject H<sub>1</sub>. But in 2006 p value is less than 0.05 and we confirm H<sub>1</sub>. The weakness relationship between variables occur in 2010 and the highest negative relationship between variables occur in 2006. So we can say that there is not any relationship between ratio of earnings per share and Cash Conversion Cycle in Tehran Stock Exchange listed company.

***H3b- There is relationship between operating cash flows and Cash Conversion Cycle in Tehran Stock Exchange listed company.***

Correlation analysis has been done in order to determine the relationship between relationship operating cash flows as independent variables and Cash Conversion Cycle as dependent variable. The correlation analysis result between these variables is shown in table 1.

Table 3: Results of Correlation coefficient of Hypothesis 1a.

	n	R	P-value	Result
2005	73	-.545	.000	Confirm H <sub>1</sub>
2006	73	-.356	.002	Confirm H <sub>1</sub>
2007	73	-.406	.000	Confirm H <sub>1</sub>

2008	73	- .217	.06	Confirm H <sub>0</sub>
2009	73	- .345	.003	Confirm H <sub>1</sub>
2010	73	- .358	.002	Confirm H <sub>1</sub>
2011	73	- .319	.006	Confirm H <sub>1</sub>
Total	438	- .344	.000	Confirm H <sub>1</sub>

According to table 5, the significant p value is less than 0.05, with 99% confidence, we can confirm H<sub>1</sub> and reject H<sub>0</sub>. But in 2008 p value is bigger than 0.05 and we confirm H<sub>0</sub>. The strongest negative relationship between variables occur in 2005 and the lowest negative relationship between variables occur in 2006. So we can say that there is negative relationship between operating cash flows and Cash Conversion Cycle in Tehran Stock Exchange listed company.

Findings show that:

- There is a negative relationship between Economic Value Added (EVA) and Cash Conversion Cycle in Tehran Stock Exchange listed company.
- There is not relationship between Adjusted Economic Value Added (EVA) and Cash Conversion Cycle in Tehran Stock Exchange listed company.
- There is not relationship between Q Tobin ratio and Cash Conversion Cycle in Tehran Stock Exchange listed company.
- There is not relationship between the ratio of stock prices to earnings and Cash Conversion Cycle in Tehran Stock Exchange listed company.
- There is not relationship between the ratio of earnings per share and Cash Conversion Cycle in Tehran Stock Exchange listed company.
- There is negative relationship between operating cash flows and Cash Conversion Cycle in Tehran Stock Exchange listed company.

The findings of this results are as same as Deloof (2003), Lazaridis and Tryfonidis (2006) and Raheman and Mohamed (2007) results.

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